

# DRAGON USER

International edition

*The independent Dragon magazine*

75p US\$3.25 February 1984

Graphics  
animation

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to business

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Drag Racing  
and Chess

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## How to submit articles

The quality of the material we can publish in  
Dragon User each month will be a very great  
asset, depend on the quality of the dis-  
cussions that you can make with your  
Dragon. The Dragon 32 computer was launched  
on to the market with a powerful version of  
Basic, but with very poor documentation.

Every one of us who uses a Dragon will  
like to discover new tricks and quips about  
every day. To help other Dragon users keep  
up with the speed of the development each  
of us must assume that we made the  
discovery first — that means writing it down  
and passing it on to others.

Articles which are submitted in Dragon  
User for publication should not be more than  
5000 words long. All submissions should be  
typed. Please leave wide margins and a  
double space between each line. Programs  
should, wherever possible, be computer  
printed on plain white paper and be accom-  
panied by a tape of the programs.

We cannot guarantee to return every  
submitted article or program, so please keep  
a copy. If you want to have your program  
returned you must include a stamped,  
addressed envelope.

## Contents



<b>Letters</b>	<b>5</b>	<b>TapeScan</b>	<b>37</b>
Including this month a professional tool at chess. Telewriter improvements and ad- ditions to Connect 4		If you've ever wanted to know how to recover from I/O errors to allow faster tape positioning, Pam D'Arcy has the answer	
<b>News</b>	<b>8</b>	<b>Interfacing</b>	<b>43</b>
All the latest software and hardware to use with your Dragon		All you need to know to build an analogue to digital interface for your Dragon — including circuit diagrams and illustrations of connection methods	
<b>Educational software</b>	<b>13</b>	<b>Open File</b>	<b>51</b>
Mike Harrison picks the dances and win- ners in this review of educational software for the Dragon (the cover illustration is by Stuart Hughes)		This month's selection from the best of residents' programs — including a chess game which allows pawn promotion and a short routine generating random circles of all the colours available in high resolution	
<b>Dragonnap</b>	<b>21</b>	<b>Dragon Answers</b>	<b>61</b>
If you want to try your hand at educational applications, but don't want to buy any software yet, this is the article for you. Gerd Meiss explains how to construct a simple maths game		Help is at hand — learn how to scroll the high resolution screen sideways, use the JOYSTICK command properly, interface to the cassette socket and create delays with the TIMER function, along with advice on linking to the Sinclair printer	
<b>Tracker</b>	<b>25</b>	<b>Competition Corner</b>	<b>66</b>
For keyboard athletes — try this fast- paced game which involves keeping all the balls in the tracks for as long as possible		A double chance to win a double prize — this month there's two sets of prizes to be won, each consisting of two different ac- cessory modules. The prizes, from JCG Microsystems, are a sound and speech extension modules, plus an arcade game and utilities program	
<b>Animation</b>	<b>29</b>		
An introduction to graphic animation (in the Dragon)			
<b>Down to business</b>	<b>31</b>		
Want to write your own small business program? Margaret Norman explains how using Adtile as an example of data storage and manipulation			

## Editorial

FIRST THE BAD news: we've had to raise the cover price of Dragon User from 60p to 75p. The good news is that the subscription rate (see the card bound into the back of the magazine) is still the same — £8.00 for 12 issues mailed direct to you. But from the next issue onwards the subscription rate will also have to go up — to £10.00 for 12 issues. So the message is subscribe now if you want to save £2.00.

But the savings don't end there, as a look at the contents of this issue will show you. We've had a lot of correspondence on educational and business software, so this month we've tackled both these subjects. Mike Harrison, a teacher himself, selects the best educational packages while we offer Gerd Meiss's Dragonnap, a simple maths game in which two children compete to be the first to spin the answer to a sum displayed on the screen. To keep things lively there is also a reward — Gerd shows you how to incorporate an arcade style game into Dragonnap so that the winner gets a few minutes of fun. On the business side Margaret Norman's Adtile shows you how to write a program which any small business will find useful. Understanding how Adtile works will also enable you to reach a better decision if you're considering buying a bigger business package to use in the office.

And for games players, there's Tracker, where you see if you can do British Rail's job any better — it's all for incorporating into Geds's Dragonnap. And if you want to improve your games programming, take a look at Dave Wintler's introduction to the basics of animation. More advanced users have Pam D'Arcy's TapeScan to explore — this machine code program allows recovery from input/output errors giving faster tape positioning. And if it's hardware projects you're after, we show you how to build your own analogue to digital interface — complete with circuit diagrams and all the illustrations you need for the connections.

This is the variety we aim to offer in every issue — although our usual software reviews will be back next month looking at the latest games for the Dragon (and preparing for a utilities special issue). We think Dragon User is a good buy even at 75p — but if you disagree, write and let us know what you think we should be doing.

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(An Independent Club run by GAMES & COMPUTERS)



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CALCULUS 15 & 16  
CALCULUS 17 & 18  
CALCULUS 19 & 20  
CALCULUS 21 & 22  
CALCULUS 23 & 24  
CALCULUS 25 & 26  
CALCULUS 27 & 28  
CALCULUS 29 & 30  
CALCULUS 31 & 32  
CALCULUS 33 & 34  
CALCULUS 35 & 36  
CALCULUS 37 & 38  
CALCULUS 39 & 40  
CALCULUS 41 & 42  
CALCULUS 43 & 44  
CALCULUS 45 & 46  
CALCULUS 47 & 48  
CALCULUS 49 & 50  
CALCULUS 51 & 52  
CALCULUS 53 & 54  
CALCULUS 55 & 56  
CALCULUS 57 & 58  
CALCULUS 59 & 60  
CALCULUS 61 & 62  
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CALCULUS 65 & 66  
CALCULUS 67 & 68  
CALCULUS 69 & 70  
CALCULUS 71 & 72  
CALCULUS 73 & 74  
CALCULUS 75 & 76  
CALCULUS 77 & 78  
CALCULUS 79 & 80  
CALCULUS 81 & 82  
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CALCULUS 85 & 86  
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CALCULUS 89 & 90  
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CALCULUS 163 & 164  
CALCULUS 165 & 166  
CALCULUS 167 & 168  
CALCULUS 169 & 170  
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CALCULUS 637 & 638  
CALCULUS 639 & 640  
CALCULUS 641 & 642  
CALCULUS 643 & 644  
CALCULUS 645 & 646  
CALCULUS 647 & 648  
CALCULUS 649 & 650  
CALCULUS 651 & 652  
CALCULUS 653 & 654  
CALCULUS 655 & 656  
CALCULUS 657 & 658  
CALCULUS 659 & 660  
CALCULUS 661 & 662  
CALCULUS 663 & 664  
CALCULUS 665 & 666  
CALCULUS 667 & 668  
CALCULUS 669 & 670  
CALCULUS 671 & 672  
CALCULUS 673 & 674  
CALCULUS 675 & 676  
CALCULUS 677 & 678  
CALCULUS 679 & 680  
CALCULUS 681 & 682  
CALCULUS 683 & 684  
CALCULUS 685 & 686  
CALCULUS 687 & 688  
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CALCULUS 697 & 698  
CALCULUS 699 & 700  
CALCULUS 701 & 702  
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CALCULUS 707 & 708  
CALCULUS 709 & 710  
CALCULUS 711 & 712  
CALCULUS 713 & 714  
CALCULUS 715 & 716  
CALCULUS 717 & 718  
CALCULUS 719 & 720  
CALCULUS 721 & 722  
CALCULUS 723 & 724  
CALCULUS 725 & 726  
CALCULUS 727 & 728  
CALCULUS 729 & 730  
CALCULUS 731 & 732  
CALCULUS 733 & 734  
CALCULUS 735 & 736  
CALCULUS 737 & 738  
CALCULUS 739 & 740  
CALCULUS 741 & 742  
CALCULUS 743 & 744  
CALCULUS 745 & 746  
CALCULUS 747 & 748  
CALCULUS 749 & 750  
CALCULUS 751 & 752  
CALCULUS 753 & 754  
CALCULUS 755 & 756  
CALCULUS 757 & 758  
CALCULUS 759 & 760  
CALCULUS 761 & 762  
CALCULUS 763 & 764  
CALCULUS 765 & 766  
CALCULUS 767 & 768  
CALCULUS 769 & 770  
CALCULUS 771 & 772  
CALCULUS 773 & 774  
CALCULUS 775 & 776  
CALCULUS 777 & 778  
CALCULUS 779 & 780  
CALCULUS 781 & 782  
CALCULUS 783 & 784  
CALCULUS 785 & 786  
CALCULUS 787 & 788  
CALCULUS 789 & 790  
CALCULUS 791 & 792  
CALCULUS 793 & 794  
CALCULUS 795 & 796  
CALCULUS 797 & 798  
CALCULUS 799 & 800  
CALCULUS 801 & 802  
CALCULUS 803 & 804  
CALCULUS 805 & 806  
CALCULUS 807 & 808  
CALCULUS 809 & 810  
CALCULUS 811 & 812  
CALCULUS 813 & 814  
CALCULUS 815 & 816  
CALCULUS 817 & 818  
CALCULUS 819 & 820  
CALCULUS 821 & 822  
CALCULUS 823 & 824  
CALCULUS 825 & 826  
CALCULUS 827 & 828  
CALCULUS 829 & 830  
CALCULUS 831 & 832  
CALCULUS 833 & 834  
CALCULUS 835 & 836  
CALCULUS 837 & 838  
CALCULUS 839 & 840  
CALCULUS 841 & 842  
CALCULUS 843 & 844  
CALCULUS 845 & 846  
CALCULUS 847 & 848  
CALCULUS 849 & 850  
CALCULUS 851 & 852  
CALCULUS 853 & 854  
CALCULUS 855 & 856  
CALCULUS 857 & 858  
CALCULUS 859 & 860  
CALCULUS 861 & 862  
CALCULUS 863 & 864  
CALCULUS 865 & 866  
CALCULUS 867 & 868  
CALCULUS 869 & 870  
CALCULUS 871 & 872  
CALCULUS 873 & 874  
CALCULUS 875 & 876  
CALCULUS 877 & 878  
CALCULUS 879 & 880  
CALCULUS 881 & 882  
CALCULUS 883 & 884  
CALCULUS 885 & 886  
CALCULUS 887 & 888  
CALCULUS 889 & 890  
CALCULUS 891 & 892  
CALCULUS 893 & 894  
CALCULUS 895 & 896  
CALCULUS 897 & 898  
CALCULUS 899 & 900  
CALCULUS 901 & 902  
CALCULUS 903 & 904  
CALCULUS 905 & 906  
CALCULUS 907 & 908  
CALCULUS 909 & 910  
CALCULUS 911 & 912  
CALCULUS 913 & 914  
CALCULUS 915 & 916  
CALCULUS 917 & 918  
CALCULUS 919 & 920  
CALCULUS 921 & 922  
CALCULUS 923 & 924  
CALCULUS 925 & 926  
CALCULUS 927 & 928  
CALCULUS 929 & 930  
CALCULUS 931 & 932  
CALCULUS 933 & 934  
CALCULUS 935 & 936  
CALCULUS 937 & 938  
CALCULUS 939 & 940  
CALCULUS 941 & 942  
CALCULUS 943 & 944  
CALCULUS 945 & 946  
CALCULUS 947 & 948  
CALCULUS 949 & 950  
CALCULUS 951 & 952  
CALCULUS 953 & 954  
CALCULUS 955 & 956  
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## A rhyme in time

HERE IS a poetical summary of *Dragon User*:

The name is *Dragon User*  
For the computer that breathes  
the fire.

Filled with all the articles and  
software  
That an owner could desire.

If ever has a problems page  
for newcomers to the sport,  
Interested for every age  
And reviews of games whose  
adents are fought.

As for external contributions,  
Only the best will the Editor ask.  
Try your hand! I expect to reward  
like same.

I did and I know he doesn't  
always reply.

Now for the readers' programs:  
There's *OpenFile*.  
To see your work in print must  
bring a smile.  
And for the letters page I say give  
a cheer!

For without it this poet's work  
wouldn't be here.

Mike Rye,  
Zones.

## Golf loses handicap

MAY I, through your magazine, contact the many people who have written to me concerning my *Golf* program published in the July issue of *Dragon User*. I'm afraid there were one or two bugs in my original listing, for which I can only apologise and try to make amends by detailing the errors.

1. Line 9045 had got itself mugged on to the end of line 9046. It should of course be entered as a separate line.

2. Line 9219 should read: ... ON PPOINT (XC, YI+1) = 3 THEN 9190

3. Line 7508 should read: ... ON PPOINT (XC, YI+1)

4. If the ball stops on the edge of the hole, it treats the hole as a water hazard. This is cured by adding line 1165 IF G1 = 1 THEN 1180

5. The ball may occasionally disappear when it is in a bunker. The cure is to amend line 1130 by inserting PSET (X, YI, YI) : PSET (X, YI+1, YI) : between

THEN and GOTO

6. When the ball is on the green there are times when it and the figure are in positions and, apparently at random, around line 1050 by inserting G1 = 0 AND between IF and GOTO.

Finally, users without joysticks may like to try amending this listing. Delete line 1130 to 1150 inclusive and substitute:  
1120 G1 = (PPOINT(X4) = 233) - (PPOINT(X4) = 233)  
1130 Y1 = (PPOINT(Y4) = 233) - (PPOINT(Y4) = 233)  
1140 IF PSET(X3) = 159 THEN  
G1 = 1/3/11 = 5/11  
1150 IF PSET(X4) = 223 THEN  
1160  
1170 IF PSET(X4) = 223 THEN  
1170

The figure will now move in response to the cursor control keys. Pressing the shift key will increase the distance moved at each step. The backspace is begun by pressing and holding the space bar, and ended by releasing it.

Phil Brooks,  
Luton,  
Hemel Hempstead.

## Write on Microdeal

HAVING PURCHASED a *Dragon* primarily to use as a word processor after seeing an ad for Teletext, I was most interested to read John Schen's article "A look at the serious side of the Snapper".

The feature of leaving out odd letters, caused apparently by all word processing packages by the Snapper's way of scanning its keyboard, did originally slow down typing considerably, but in fairness to Microdeal their latest modification to the Teletext program, only just issued, has improved things spectacularly and it is now possible to type quite fast.

One of many excellent features of Teletext is the ease with which it enables one to access characters available on one's printer (but not on the Snapper's keyboard) — particularly useful if, like me, you have to type a lot of stuff in foreign languages with accents and cedillas.

R Hasted,  
London SW6

## Hi-res input

IF YOU want to input information while using the high resolution screens, then try the following:

```
100 A$ = ""
110 POK 135,0
120 A = PEEK(135):IF A = 0 THEN 120
130 IF A = 13 THEN 150
140 A$ = A$ + RIGHT$(CHR$(A),1) : GOTO 100
150 Now proceed with the program using the input information held in A$
```

If a variable is required then make 150 A = VAL\$(A\$)

JP Fisher,  
Walsmead.

## Adding to Connect 4

ONE OF the best games you have published in your magazine was *Connect 4* in the October issue.

I play it all the time, but found that the coding to ensure that there are no obvious moves for the computer to cover in a vertical direction were missing.

I remedied this by adding the following lines:

```
1141 A=0
1142 A=A+1:IF A > 8 THEN 1144
1143 IF G$(A)=1 THEN 91-92+1:GOTO 1142
```

## Software Top 10

1 (2)	Mixed OUI	Quickplus
2 (7)	Pettigrew's Diary	Shanda
3 (-)	Night Flight	Salamander
4 (5)	Ring of Darkness	Wintercoat
5 (9)	Dragonfly Two	Hewson Consultants
6 (-)	Griffinrunner	Salamander
7 (6)	Chameleon	Peaksoft
8 (-)	Lionheart	Peaksoft
9 (1)	Frogger	Microdeal
10 (-)	Monaco Grand Prix	Microdeal

Chart compiled by Boots

1144 A=0  
1145 A=A+1 : IF A < 1 THEN 1147

1146 IF G\$(A)=1 THEN 91-92+1:GOTO 1145

1147 IF SV > 2 THEN 1150

1148 IF SV > 3 THEN 1150

This has greatly improved the program and makes the computer much harder to beat.

JP Davington,  
Cardiff

## Just not cricket

I HAVE just purchased a *Dragon 32*, and with it *Dragon Chess* from Ocas Software — and I might add I am very pleased with both. But (and there is always a but isn't there?) it cannot beat the computer.

Although at the moment I do not know much about programs I do know how to play chess. But when I get the computer on the run it calls a draw and stops the game — which isn't cricket (I mean chess) is it? I like to finish my game even if losing.

The reason I have written to you is to ask if you or any readers can come up with something to override this decision.

Maurice Brown,  
Preston,  
Merseyside.

**SOUNDS** like a professional foot to us. Either your *Dragon* is the first with artificial intelligence — or there's a fault in the software. Try writing to Ocas Software, Lower North St, Chesham, Bucks. Perhaps they should be able to help.

## Atari interface

IN RESPONSE to your answer to Stephen Wood in your December issue, there's no need to send off to me as for an interface connecting two Atari-type joysticks to the *Dragon*.

Colossal Computers can supply such an interface at £14.95. We also supply Wood's famous Red Ball joystick at £14.95 and Trackball at £25.95 (Trackball does not need an adaptor).

David Nottmouche,  
Colossal Computers,  
4 Middle Row,  
Chipping Norton,  
Oxfordshire



# Oasis Software present...

## The first basic compiler for the DRAGON 32



SPRINT compiler is a subset of standard Dragon Basic which contains arrays, strings, four next loops, in fact virtually everything except floating point, arithmetic and associated commands. All arithmetic is integer and the Dragon sound and graphic commands are fully supported.

### SPRINT BASIC COMPILER by Dr. David Gray FOR THE DRAGON 32

The technique used is based on the approach used in GIC 8.0. Pascal where the Basic program is first reduced to intermediate code and this is then executed using a run time package which is saved with the rest of the compiled program.

- Programs will run 5-10 times faster.
- Almost the entire Basic is supported, with the exception of floating point commands.
- Code produced will run independently of the compiler (for potential authors).
- Programs are compiled from tape under remote control so that much larger programs can be compiled.
- SPRINT is designed for ease of use and a comprehensive manual is included.
- Free demonstration program with each program bought to illustrate the full power of the Compiler.
- All Oasis products are covered by a lifetime Guarantee.

### COMMANDS ..... 0-14.00

Dragon Pascal is an extended integer subset of the structured programming language Pascal. A few of its many features include:-

- A complete set of structured programming constructs.
- IF, THEN, ELSE, WHILE, DO, CASE, GOTO.
- COMPILED, EDITOR and SOURCE simultaneously resident for a rapid development cycle and total ease of use.
- Very rapid compilation. Source can actually be compiled more rapidly than it can be typed.
- Fully recursive.
- Supplied compiler with sample programs including routines which demonstrate techniques for simulating floating point functions such as SIN() and COS().

OASIS SOFTWARE Alexandra Parade  
Widnes - near Manchester M26 1QT

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SPRINT Basic Compiler £14.00 ☐

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## DRAGON CHESS £9.95

- Six levels of play.
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- Loading and saving of games positions from tape.
- High resolution graphics which can be flipped round to make black or white play from either end.
- Simultaneous text and graphics.
- Slides can be exchanged at any stage.
- Best move hint.
- Set up from any position.
- Opening move library.
- Moves may be taken back and play resumed from any point.
- Change level of play at any point in the game.
- Will adjudicate games between humans.
- Very high standard of play.
- Professional packaging and lifetime guarantee.

Dragonchess is without doubt the best value chess on the market today. ... MICRODEAL

**BACKGAMMON**  
£5.95

**OTHELLO**  
£5.95

**INVADER CUBE**  
£5.95

**DOMINOES**  
£5.95



The well known game of Backgammon complete with full instructions and computer demonstration for beginners.

At last, Othello or Reversi as it's sometimes known running on your Dragon for 4 levels of play, full instructions and computer demonstration for beginners.

As well as being one of the best games of skill written for the Dragon 32 it also has some of the best pure machines code graphics we have ever seen.

Two games in one with full instructions. Hours of fascinating fun this program has 4 levels of play and on the higher levels. Whichever it's play for it's assessment of your ability.

## Mind Games Compendium — All five games for just £19.95

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COMPENDIUM	£19.95 <input type="checkbox"/>

I enclose cheque/PO for £

NAME .....

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OASIS SOFTWARE —

The Company that specialise in computer utilities.

## Shards additions

NEW games continue to emerge from Shards following its success with Penelope's Diary and Simples.

The company launched two games at the end of last year, Hooked and Monster Maths.

At £9.95 Monster Maths joins Shards' growing list of educational titles. It is a menu-driven mathematical cassette for 8-14-year-olds.

Hooked, on the other hand, is a fishing game presented in French graphics which involves catching and landing as many fish as you can.

## Cotswold comms

COTSWOLD Computers can now supply software linking modems to established databases and easing interface communications with the outside world.

Cotswold already markets an RS232C interface at £49.95. Adding the software, written in machine code, will allow Basic commands to go straight out through the interface.

The package, including documentation and tape, costs £14.00, and was developed by software engineer Tony Richards of Richards Systems.

Tony is also interested in writing modem software, enabling links to be established to databases elsewhere. One example quoted is of linking to the Internet legal database.

Tony can be contacted by writing to Cotswold Computers, 5 Mobile Row, Chipping Norton, Oxfordshire.

### COMPUTER CLASS



"Out of 50,000 or over at the moment, it's difficult to get a good idea of what's going on."

# Adventure fun plus turtles on the way

MORE adventures are on their way from Salamander — along with a Turtle graphics package.

Turtle Graphics costs £9.95 and will be released at the end of January. It has a comprehensive range of Turtle-type commands and a "huge manual".

You can design patterns, manipulate images, repeat shapes and achieve perspective effects by using string handling. The package is compatible with the Tandy four-colour printer/plotter.

The two new adventures, due at the same time, are Wings of War and The Cocklewood Incident. Each costs £7.95.

Wings of War is similar in style to the Dan Diamond trilogy. The story-line here is that you're parachuted into France and have to find your way through the rears in a chaotic state.

Cocklewood Incident takes a more humorous approach to adventuring. You have a choice of six roles to adopt, ranging from Absolute Willy to John Travolta, is your



Salamander's Peter Orison — having fun in Cocklewood

search for the girl.

The game is based loosely on the Monty Python holy Grail film, and has a similar sense of humour. Your opponents include Hatt's Granites and a hail of Foster's lager cans.

Peter Orison, Salamander's projects director, said that the humour made the game particularly attractive.

"There's not many adventures around which are actually amusing while you're playing them," he explained.

Part of Peter's work involves assessing programs sent in by Dragon users. "Some are worth developing," he says, "but it would make my life a lot easier if I was sent a few clues and maps as well."

## Microdeal racks them up

MICRODEAL went into the New Year with more than 60 software titles under its belt, and a range of new releases are being planned for the Easter.

The most recent games from the company are all aimed at arcade fans — with the exception of two simulations, Pinball and Eight Ball (a version of Pool).

The arcade titles include Space Raiders, which is "a much, much better version of Space Invaders", and two games from US author Ken Ralston, whose past successes include Cutthroat in the Jungle and Phantom's Revenge.

New from him are the 3D game Danger Ranger, and Devil Assault which has three different screens and five levels of play.

Microdeal's list of UK-

written programs is also increasing. Dave Thatcher, who wrote Cutthroat, goes. Well, about, has contributed Dragon Hawk, Rick Pedersen has written a real-time version of Star Trek called Space Fighter, and Skramble, with five different screens, comes from Steve Beck, who wrote two earlier Cutthroat titles.

Each game costs £8.00. The price goes up to £18.95 for the more serious programs such as recent releases Rainbow Warrior, Tetris/orth which includes a tutorial and a Forté screen editor and Finisar (a strangely spelled title with a familiar appearance — database).

Rainbow Warrior is similar in concept to the word processing package Tetris/orth, it offers lower case, but this time for normal Basic. It also en-

ables you to define your own alphabet for such things as foreign languages.

Microdeal's John Symes added that "a lot of other programs are on their way for the Dragon — probably to write faster".

The company will have larger stands at this year's PCW and Earls Court shows, enabling users to try out more games — "possibly 30 more than at each".

Being worked on at the moment is a disk adventure with graphics, while a Cutthroat follow-up, Cutthroat in the Mines, is planned for February.

Microdeal is also starting a Cutthroat Club. Membership is free (entry forms are included with each game cassette) and entitles you to a quarterly newsletter featuring high scores, programming tips, etc.



## WINDRUSH MICRO SYSTEMS



**MACE** by Graham Tootill  
EDITOR  
ASSEMBLER  
MONITOR  
£ 29.95  
BRADON 32 CARTRIDGE

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**Abstract**

THESE RESULTS WERE OBTAINED FROM A SINGLE-FACTOR, BETWEEN-SUBJECTS, REPEATED-MEASURES DESIGN. THE FACTOR OF INTEREST WAS THE TYPE OF PRACTICE (CONCURRENT AND SEQUENTIAL). THE DEPENDENT VARIABLE WAS THE NUMBER OF CORRECT RECALLS. THE RESULTS WERE ANALYZED USING A TWO-WAY ANOVA WITH PRACTICE TYPE AND RECALL TYPE AS FACTORS. THE RESULTS OF THE ANOVA ARE SHOWN IN TABLE 1. A SIGNIFICANT MAIN EFFECT OF PRACTICE TYPE WAS OBSERVED ( $F(1, 18) = 10.5, p < .01$ ). A SIGNIFICANT MAIN EFFECT OF RECALL TYPE WAS ALSO OBSERVED ( $F(1, 18) = 10.5, p < .01$ ). A SIGNIFICANT INTERACTION EFFECT WAS ALSO OBSERVED ( $F(1, 18) = 10.5, p < .01$ ).

**Abstract**



**D-BUG** by Stewart Bur  
TRACER  
MONITOR  
DISASSEMBLER  
£ 29.95  
DRAGON 32 CARTRIDGE

\*\*\*\*\*  
 \*\*\*\*\*

REPORT TO: MEMBERS OF THE HOUSE OF REPRESENTATIVES  
FROM: THE HOUSE OF REPRESENTATIVES  
SUBJECT: THE HOUSE OF REPRESENTATIVES  
DATE: 1998-01-01

[illegible][illegible][illegible]

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1. The first step in the process of identifying a problem is to determine the nature of the problem. This involves gathering information about the problem, such as its location, its duration, and its frequency. Once the nature of the problem has been determined, the next step is to identify the causes of the problem. This involves gathering information about the factors that may be contributing to the problem, such as the environment, the people involved, and the resources available. Once the causes of the problem have been identified, the next step is to develop a plan to address the problem. This involves determining the goals of the plan, the steps that need to be taken to achieve those goals, and the resources that will be needed to implement the plan. Finally, the last step in the process is to implement the plan and monitor its progress. This involves putting the plan into action and tracking the results to ensure that the problem is being effectively addressed.



**BUG ZAPPER**  
MULTI-PROGRAMMER  
£ 79.95  
DRAGON 32, CASCADORE



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[illegible]

4. Is the "Good Guy" Argument Relevant? (and is it possible for them to be relevant, but irrelevant to this decision in its present or its past or its future form and as stated by respondents in appropriate ways)

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## Welcome to Dragon World

THE *Stop Press* newsletter from Dragon Data has grown in size and changed its name to *Dragon World*.

The first issue came out in December, taking over from issue 14 of the newsletter. Subsequent issues will be published once every two months.

There's 16 pages in December's *Dragon World* and *Dragon*.

Dragon Data expects the February issue to be bigger.

The magazine is mailed out free to users who have returned their warranty cards.

The address for contacting the new magazine is *Dragon World*, Dragon Data, Heming Industrial Estate, Heming, Pott Talbot, West Glamorgan.

The contents of the first issue are similar to *Stop Press* — with a machine code corner, young user pages, readers' letters and a selection of programs.

Additional features are a technical advice column and user club news.

## ITL ponders 3 inch Dragon disk drives

ITL HOPES to produce an interface for its Byte Drive 800 three inch disk drive which will make it compatible with the Dragon, despite problems with one of the Dragon's interface chips which may necessitate a swap.

The 3 inch disk format is said to offer more "bytes per pound" than the more common 5 1/4 inch type, and may well become the small business market leader when a full range of applications software is available.

ITL's Tom Boyle commented that the potential of the Dragon was such that it would be unfortunate if the technical problems involved could not be overcome.

Then the Byte Drive 800 could compete with the two Dragon disk drives already available, from Dragon Data and Curvema. Tom expected to see three inch drives with one megabyte capacity being available.

Work on the cable interface for the Dragon, which should cost around £100 with the disk drive and manual, should begin once ITL has finished developing Sinclair Spectrum and Commodore 64 versions.

A full range of software, including assembler/disassemblers, text editors, spreadsheets and databases, is now in preparation. ITL also hopes to make several popular games available on three inch disk.

## Pick a printer from Tandy



Tandy's GCP-220 — another colour for £149

MORE THAN 10 Dragon-compatible printers are now available from Tandy — ranging in price from under £100 to over £1,000.

The TP-10 Thermal Printer is the cheapest, at £78.95. It prints at 30 characters a second on 4 1/8 inch wide thermal paper which costs £2.00 a roll. This is the only printer in the range requiring special paper.

The GCP-115 four-colour printer/plotter at £149 is already well-known. More recent is the GCP-220 which adds another three colours (yellow, violet and magenta) and increases the print speed to 40 characters a second in text mode.

These printers are said to be ideal for line listings. Worth considering for low end letter

quality printing is the GMP-130 at £289. This is a 9 inch dot matrix printer with word and data processing modes.

Print speed is 50 characters a second — or 25 for word processing. For better quality look at the G99 (GMP-210) which prints at 18 characters a second.

Higher up the range is the G99 GMP-420 which Tandy describes as "excellent for the small business user with big throughput". The company expects the market for such printers to rise as the G6-9 operating system takes off.

Finfold paper up to 15 inches wide can be used with this dot matrix model which prints at 140 characters a second.

Top of the range is a daisy-wheel model at £1,399.

# First games for the 64

PHOENIX Software is one of the first companies to take advantage of the Dragon 64, offering a package aimed at adventurers and arcade fans alike.

The Emperor Must Die is a twin-cassette package released this month at £9.99 — one cassette features an adventure and the other arcade action.

The story line is that the emperor of the galaxy is corrupt and you are chosen to assassinate him, determining that you can't join the force set along the way.

These levels present themselves in the form of three



Phoenix's Gerry Rose

"Hix" is the action cassette using 221K of memory and two to the adventure (plus one brief visit using 48K).

The Emperor Must Die is Phoenix's first offering for the 64. Previous software from the company, set up last year by Gerry Rose, also featured the twin-cassette concept, but was for the 50 only.

You begin with the action cassette, a space game where you have to reach a randomly arranged sequence of control towers on different planets.

Reaching a third tower gives you the naming code for the first adventure, set on an unknown planet where you have to survive against the native inhabitants, wild animals and an unfriendly terrain.

Surviving gives you the

locations of the first five control towers on the action tape and the correct order for reaching them.

Doing this successfully gives you the naming code for the second side of the adventure — in which you recruit personnel and buy equipment to build a rocket capable of defeating the emperor.

Success here takes you back to the second five control towers on the action tape, collecting clues along the way for the final mini-adventure. The clues direct should then follow on the adventure planet with your assassination attempt proving successful.

# Just the thing for these long winter nights

## DRAGON 32 FAMILY PROGRAMS

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elderly child and adult ...

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### ON SCREEN

### ON SCREEN

### ON SCREEN

### ON SCREEN

### ON SCREEN

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## TIGER I.Q. TEST

TIME 00:23

1)

WHAT IS THE MISSING NUMBER ?

4      7      10      13      -

# An educated look at software

*Mike Harrison picks the educational dunces and winners*

ANSWER:

&lt;ENTER&gt; TO PASS

&lt;CLEAR&gt; TO TERMINATE

DO YOU remember those heady days when you first got your Dragon? How it was going to amuse, enthuse and educate your family. How your finances and home management problems would be a thing of the past and children's learning be smoothed.

Well, think on. Just how many delivered mistakes have you rescued, frogs have you squashed and Kingoms capped? Compare this to the educational use your computer has had. Up to now you've had the excuse of lack of appropriate software. Is that true now? Every advert seems to rely on an educational tag so let's see if the excuse still holds up.

## Spelling

Talking Speller, for example, is an ideal program to encourage children to learn those school spelling lists. You know, the ones they produce from their pockets for the first time ever breakfast on the day of the test itself. Schools all seem to set these tasks but seldom advise on how best they should be learnt. This in the shape of this £8.95 Eurosoft tape is at hand.

The user creates a data file, with careful input controls to ensure a good chance that words on the file are in fact spelled correctly and then helps the child make a word-track on tape for each of the words.

Children can then test themselves using these audio cues in their own account, at their own speed either immediately or at some time later by reloading this data. The strength of this program is also shown in error handling. It tells the user if his

response is too short or contains too many letters and shows children the letters they've got in the right places so they can immediately make some attempt at correction.

The novelty value of the tape as it stands is a strong incentive to learning. The added graphics drawing capability in the version now on offer makes this a good educational program. It is not of course limited to learning spelling lists. I used it as a French/English vocabulary primer and it could be used in any circumstances calling for the Dragon's special ability to translate sounds from tape to TV.

The Dragon (2) missed out on the Department of Industry microwaves in schools scheme, possibly because its test is only in capitals. Children's reading is always in lower case and although it is possible to draw these in high resolution many educational programmes have missed this point, even when producing material for micros. It is ironic therefore that Galactic Hangman which is played entirely in lower case capitals, is played entirely in lower case capitals on the screen. This cassette is also from Eurosoft and costs £7.95.

The unfortunate prisoner is saved from hanging if you can guess the word. In fact a spaceship destroys the whole jail in the event but what happens to the other inmates we never do find out. Quite good fun and in basic so the data can be accessed, but it is severely educational. It doesn't teach anyone anything. It doesn't reinforce spelling or even teach tactics or strategy because the language is so full of

exceptions to contradictory rules. It has no role in developing language skills, as words need to be taught in the context of their meaning.

Silly Syntax, the third in the Eurosoft series, does do just that job. In Silly Syntax the importance of words is highlighted by the creation of funny stories much on the lines of Consequences, the party game. There are a number of basic storylines with players being asked to provide a noun, or adjective or nonsense word which is then injected into an appropriate part of the story to sometimes hilarious effect.

Many primary school children may have come across procedure exercises in school where every seventh word or so in a story is blanked out and from the context he has to supply an appropriate word. "Both Billy and John like \_\_\_\_\_ chocolate", might encourage replies like milk, hot, three or eating. The basic story can be shown with the "gaps" to be filled in Silly Syntax and there is a creative mode where children can enter their own work which has been stimulated by the game. All options can be output to a printer. Silly Syntax is £8.95 and 80 further stories ranging from Fairytales to X-rated (for adults only) are available.

## Skills

Eurosoft's range of educational products also include Alps at £14.95 and Melody Express at £7.95. Alps is a C++ compatible interpreter which allows easy entry into assembly language programming. ▶

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RANGE OF  
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SOFTWARE  
AVAILABLE.  
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STAMP**

[illegible]

## TOOLKIT FOR DRAGON 32

NEW

[illegible]

- 1 Press, screen editor allowing comparing, parameter storage and more. Auto convert to the (BASIC) line editor.
- 2 Super calculator, 240 x 1024 - software on screen or on disk.
- 3 32 bit option for fast Fourier transform, matrix storage and self-compensate for viscosity setting in flow rate calculations (small).
- 4 Full range of statistical calculations, 1000 data points, calculation of factored cross mass or sample size.
- 5 Full range of chemical calculations, compounds with standard chemical options.
- 6 1280 byte tape streamer, full range of print options.

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- **EXERCISES** **GROUP** commands allowing students to be assigned items, eg GROUP1 or GROUP2
- **EXERCISE** **NAME** commands which are for sub-commands, thus defining graphics for initial
- **GRAPH** and **EPGRAPH** commands for vector graphics modification
- **Color** compatible with postscript/printers and a choice of fonts

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## NEW

- **BRACON** fits **ICP/ETH** on disk for **DELTA** ■ Executes up to 10 times faster than **BASIC** ■ Longcode extendible by user defined words ■ Words can even be defined using the **ICP/ETH** assembler for maximum speed ■ **BASIC** and **DELTA** programs still fit programs from **ICP/ETH** ■ Source code stored and can be compiled from disk ■ **ICP/ETH** can fit programs disk, installation site ([www.deltatronics.com](http://www.deltatronics.com))

**Abstract**

- [illegible]

[illegible]

**DISCOUNTING** is a fully automatic spreadsheet using standard conventions and providing a 100% return on your investment. It is a powerful tool for financial planning and analysis. The program is designed to be used by non-accountants and non-finance professionals. It is a fully automatic spreadsheet using standard conventions and providing a 100% return on your investment. It is a powerful tool for financial planning and analysis. The program is designed to be used by non-accountants and non-finance professionals.

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# PREMIER

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10.1016/j.jmb.2004.04.002  
 Type: A-1 (1995), B-1 (1995)  
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 Journal: J. Mol. Biol. 340:1-12 (2004)  
 doi:10.1016/j.jmb.2004.04.002  
 Title: Amino acid sequence homology  
 between the two subunits of the



# **CHESHIRE CAT** **EDUCATIONAL SERIES** from **AMPALSOFT**



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• for "IQ" level computer science. *Meleody Express* provides a simple introduction to keyboard skills as an introductory stage to musical programming.

*Tiger Software* is another company which advertises "Educational Software — designed by experienced teachers". The *Tiger IQ Test* is beautifully drawn on the hi-res screen and looks far all the world like the exam paper I'm meant to be. The test is timed and (a nice touch) the clock only activates when the full page is complete and ready for your answer. There is a great variety of questions such as:

WHAT IS THE NEXT NUMBER IN THE SERIES

4 7 11 14 22 —

WHICH WORD IS THE SUFFIX

S  
P  
BL  
P

as well as special questions giving an all round test of this sort of reasoning (for the hard-thinking the answers are 29 and 8AT).

The *IQ 95* tape contains two 40-question tests. At the end of the test your supposed IQ and an indication of your intellectual worth are announced. If taken as a bit of fun, or even as a practice to give you an idea of what to expect in IQ tests (more commonly called verbal reasoning tests), this program is free but expensive. After all you can get paperbacks at £1.50 with dozens of tests in. Where I take issue with *Tiger* is in its use of the "Educational" tag of convenience — for this it certainly is not. An intelligence quotient is calculated with reference to a student's age. No request for age is made. I refuse to believe that a 10-year-old and 30-year-old getting the same score on this test have the same IQ. *Tiger's* test says they do. In fact we are not told if this test is for primary children, 15-year-olds or first executives (all properly constructed tests should have a target age range).

If you expect to get better at these tests by entering from the answer page you can forget that too. For although you can compare your list of answers to those of *Tiger's* this is in isolation from the actual questions which you cannot recall except by taking the test again. Anyway without knowing the reason for the "correct" answer no learning can take place at all.

### Child-proofing

My final criticism of this tape applies to many others too, and concerns child-proofing. This means helping the user to show his knowledge and not make mistakes due to the computer's method of working. For example in the question

WHAT IS THE NEXT LETTER

A C E G —  
H F D I J

some children typed in the letter 'I' which is correct reasoning but not the answer 'G' which was acceptable. It is easy to restrict

returns on a computer — so why not do it.

Child-proofing was also lacking on the *IQ 95 Tiger Gated Pix* which is a racing game for one or two players. The players are assigned cars which go around a circuit by moves dependent on the throw of a die and the answering of a general knowledge question. There are around 500 different questions in 13 data files suitable for five different age ranges from seven to adult. Younger players get questions including simple maths and spelling, and adults need to know obscure items from books of records. As in the *IQ* test no attempt is made to teach anything and although general knowledge quizzes may be fun, to test them under the guise of "education" is both misleading and potentially harmful to the market.

Not much better is the *IQ 95 Etiquette* from *Game Software*. This takes the form of the TV quiz *Winner Takes All*, so it does limit the value of allowing players to test their judgement by the aim of their bets. It is well child-proofed but with questions like "Who was married to the Monarch whose reign began in 1422?" we have perhaps gone beyond the age where this is necessary. At a time when children are learning to break state security codes and pull down information from thousands of miles away, it seems incredible that these programs ask obscure and useless facts about mountain ranges, long dead rulers and 100-year-old inventions. This program even has a mistake. Islamabad does not exist (the town in Pakistan is Islamabad) and San Cristobal is not the capital of Cuba either.

### General knowledge

Perhaps the computer, then, is not the best way of testing general knowledge as misunderstandings cannot be dealt with and multiple choice questions are open to guesswork. The type of skill that the *Dragon 32* is ideal for, however, has been exploited very nicely by *Crusaders Home Computers*, in its *Teach Type*. This *IQ 95* program aims to have you touch typing in 18 hours and shows the correct finger for each letter as it is introduced. Visual representation of accuracy and speed encourage you to look at the screen, not the keys as you type. Typing is such a useful skill for teenagers to have in the fields of computers, journalism, further education and clerical work that *Crusaders* deserves to succeed with this program. Those who are learning already may find the absence of home keys a little daunting but will be relieved from *ASDP-LKJ* boredom. The *Dragon* keyboard being one of its stronger features over its rivals, *Teach Type* ought to be a winner.

*Tick Tock* is a courageous attempt by the same company to design a program suitable to help reinforce time telling skills in young children. A friendly clock (looking not a little unlike Mr the Engineer's face) is drawn on the screen, and hours, half-hours and quarter-hours are displayed for children to read. The face rewards you with a wink and a smile when right. The display is colourful, chunky and appealing

IN WHAT COUNTRY  
SIERRA MADRE?

1 IRAQ  
2 ROMANIA  
3 CANADA  
4 MEXICO  
5 KENYA

NUMBER ?  
SCORE : QUESTIONS

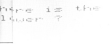
Game Software's Etiquette Geography



Dragon Games Hide and Seek



Game Up from Microsoft



to children and the flicky flicky dock theme attractive.

The program has however, a few flaws. The key to successful time-telling is to distinguish between the long and short hands and to read the figures clearly. Making the hands different colours is not gained enough (some people use mechanical TVs) and real clocks have hands the same colour. The eyes and mouth on the clock face are confusing and distract attention from the real action. One eye makes 10 look like 18. When the child has made a mistake it is not corrected and once a key has been hit a cannot be backspaced. The method of answering requires quarter past two to be entered by 2, colon, 1, 5 or it's wrong.

It is quite possible, if the real purpose of the tape is to teach time, for these difficulties to be overcome by re-programming, but especially what is needed is an experimental phase to precede these tests. Why not allow children to put in some times and then make the clock show them? Tests could then be based on what the child himself had typed in previously. Lastly children up to six or seven have not learnt 6.40 or 5.30 but still talk about quarter-to and half-past. If revamped this little program could possibly be the finest of the bunch, and would be in demand in infant classrooms as well as at home.

## Drowning

Baby Dragon (C8.95 from Gravesend) contains two programs for young children. Koko does nothing more than any Dragon user could, generating random numbers, to be multiplied, divided, added and subtracted. All the action takes place on the text screen and no one has bothered to child-proof it. Letters are bound to be entered by mistake by young children and the consequent REOO? wipes out part of the print (as graphics). The program has to be run again if this happens or if break or clear are touched. The object of the exercise seems to be to drown poor Koko (not very sporting) but when this happens the water rises up against gravity to cover him. This is, of course, graphically easier than having him fall in but difficult to explain to an enquiring six-year-old.

Much better in presentation is the other program Teddy. A number of honey pots seek your help in bouncing past sleeping bears who in turn hope to catch them, and suddenly sit up to do so. The hi-res graphics are very well drawn and the game is lots of fun for little children who only have to control the jumping by use of the space bar. I would say that three and four year olds would learn quite a lot trying to decide when to jump and if a score of successful escapes were displayed it would be a learning situation.

Unfortunately no scores are displayed for the program is yet another test. The children are supposed to count the honey pots out and count them back in again (pretence for BBC war correspondents?). However they won't be able to read the inevitable only questions run to remember to keep adding on the pots to their running total to satisfy the examiner. So I'm afraid

it's thumbs down for Baby Dragon.

Many people who have recently purchased their Dragon from a large department store will be familiar with Ambulsoft's *Christine Can Make Tutorials*. A package for younger children in the same series is *Maths 1*. It is a very versatile program. Options on difficulty level, display of players' scores, changing the running order of exercises and the number of different questions per exercise all exist. Each of the 10 different exercises is introduced by a nursery rhyme and difficult reading is avoided as the programmers assume that an adult is around to help out where necessary.

## Kangaroos

The player's names (drawn on hi-res screen but unfortunately in capitals) act as a prompt for their answers. Only numerical answers are accepted and wrong answers are instantly shown to be so. The program is geared to learning rather than just testing and is beautifully designed. Children are asked to count the balls kicked into a hole (of Piersen?) by a kangaroo, and asked to make numbers of balls float into harbour in response to numbers shown. Sorting, mapping, sets and simple addition are included in these exercises, including a lovely one towards the end where children have to find the tallest and shortest in a line of flowers.

The package comes with two complete tapes (both double recorded) in a large plastic folder with some documentation. Unfortunately, for security reasons, the programs load additional data when running so breaking the program means the tedious process of re-loading. However, *Maths 1* will certainly give young children a good start in practising simple numbers before they start school and despite its £19.95 price it is good value for money.

Order children need practice in tables and numbers too and *Allyn Software* has two £7.95 programs to provide it. *Sums 1* starts with a menu option for the four rules of number and a comprehensive set of instructions. The sums are presented in hi-res and there is graphic representation of sums and time left. The slowness of the basic means that keyboard responses against the clock become difficult. To enter 44 the sequence 4, 4, <ENTER> is too fast and is registered as 4 <ENTER> and marked wrong. Once you slow down and get the hang of it you run over time too.

By the time *Allyn Software* produced *Sums 2* it had learned the lesson of lower case and presents seven pages of instructions in a style most children will be able to read. This is wise as the subject matter — manipulation of fractions — is suitable only for children five years older than those for whom *Sums 1* might be useful. Wrong answers are erased and the method for gaining the right one shown. Perhaps future programmers would bear in mind that the computer lends itself easily to showing addition and subtractions of fractions in pictures (of cake for example), and incorporate this in their programs.

However, it is a puzzle to me why anyone wants children to drag up ▶

• their minds with ways for finding  $\frac{1}{2}$  of  $\frac{2}{3}$ , especially when we have machines as cheap as calculators to do it for us. No one expects us to do without our lawnmowers and learn to cut the grass by hand, or to learn how to rub two sticks together to roast the Sunday joint. I've been perfectly able to manipulate fractions for 25 years but still am waiting for it to be put to some use. However, some schools do still require pupils to learn these things and if your son or daughter is having difficulty then maybe *Sums 3* might be the answer.

## Circus

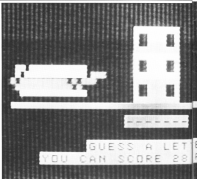
Of course, there is much to learn about computers and the way they work apart from using them to reinforce school work. *Circus Adventure* (Dragon Data CT86) sets out with the aim of doing just that job for primary school age, incorporating a number of user inputs "to encourage familiarity with the keyboard" and presenting the child "with a series of choices to be made". The child who is lost somewhere in the circus has to try to find the popcorn stand. Dragon Data adds that "the average playing time is between 10 to 15 minutes", but I couldn't find anyone to persevere that long with such a boring game.

An adventure game, of necessity, should allow the player to reason out some of the moves or at least get the "you're getting warmer" ideas. No such luck with *Circus Adventure*. Educationally it is a disaster for it expects children to opt for left and right, north or south without giving any indication of what such concepts mean. The choices it provides are without consequence and meaning. It asks do you want to go UP or DOWN (presumably underground), and treats UP as a mistake for it only wants the top letter. Now every Dragon owner knows that in this case you would use a restricted **INKEY \$** or use a **LEFT \$** routine after input but such subtleties are beyond *Circus Adventure*.

There is no logic in the game plan either. Starting at the entrance and going east leads you to the Tiger's cage. UP (suspended?) is the ticket booth, go right, down and north and you are back at the entrance. The only place this is true is at the north pole. Needless to say this program for young children is entirely in last capital.

This game bears no comparison to *Quest*, another Dragon Data adventure. *Quest* has no pretensions to be educational yet the consequences of moving N, E, S or W are shown on the map. It involves trading and bargaining, the tactics of building up suitable forces and equipment and strategic planning. It has immediate rewards and is a much better way of introducing adventure games and "computer terminology". So my advice is to leave *Circus Adventure* to the monkeys.

*Hide and Seek* from the same stable is an excellent machine code program written by Applied Systems Knowledge. It uses the full potential of the Dragon's graphical capabilities. It consists of a stimulating series of hide and seek type games



Shanda Software's *Fun to Learn* - sure to L&E and offers five games

of the Kim's Game variety. It briefly familiarises children with the objects to be hidden, encourages matching skills and short term memory, and at the end the association of words with the pictures of the objects they represent. Some important pre-reading skills are incorporated in this superb program which is completely in high resolution colour and uses lower case letters throughout.

## Value

These (and two) programs in the package taking over five minutes to load, 35 very good clear detailed pictures are drawn and a small dictionary is supplied to look up spellings for the final stage. A very nice touch is the use of on-screen symbols to prompt the need for the space bar or re-adding of a word. You can also return to the menu at any time during any six games. Super value for money at £15.95.

Microcad's *Calculator* at £25 is the most expensive of this batch of software. It is packaged in a large ring file with two tapes and pages of detailed documentation.

The first program has similar characteristics to *Talking Speller* (reviewed earlier) except that the time for words to be put onto tape can be varied from between three and 30 seconds per word. Hence sentences showing the word in a sentence could be spoken. You can also get a print-out of results. In other respects this version is not as good as *Farneoff's*. You get only one chance of each input (although you can alter words when lat has been completed; all answers accepted and incorrect ones are listed

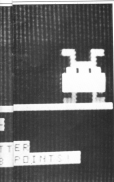


Interact Pack from Shanda Software

against the true versions at the end of the test.

*Word Drill* consists of a series of multiple choice questions in which students are asked to find a word to match definitions. The words and definitions may be added and a data file created or taken from a demo file provided with the package. You could of course use this to test yourself on chemical formulae or make up a game





graphical quiz — much in the same way that writing questions on one side of a card and the answer on the other is used as an aid for death learning. All the words and their definitions can appear on the text screen on command.

Maths Drill allows the digits in answers to computations to be entered right to left as in pencil and paper exercises. In long multiplication questions, partial answers

can be entered to build up the sum — but without wrong attempts it made to analyse why a wrong answer has been reached. In fact when the correct product is printed the figures do not appear in the right columns. A tedious reward is offered. It is a glimpse at a three face consisting of a circle line and two dots, the sort of thing you will have first drawn on the three screen when learning.

The fourth program is Estimate which asks a difficult sum and then tells you how far out your guess was.

This set of programs was put together by Tim Mix, the Dorkey King man and goes to show just how far behind educational software is compared to games. None of the ingenuity which goes to make up an arcade game (a variety of screens, come-again motivation, fast action and simple aims) is present in this package. It is just dull and stale drill and practice. In fact it is the opposite to what people in education and computing hope for from professional programmers. At this price it is exorbitant.

Micro Debug Consultancy's Tables Tutor at £4.95 follows the same pattern of random number generation that we have seen before. It is child-proofed in as much that the break key has been disabled but poor answers can be letters or spurious symbols and these are accepted. In all this is an unenterprising program, children would soon find it boring and it wasn't quite quick enough at displaying question after question to be a real test of tables and skill.

Shards Software has four educational programs ranging from £3.95 to £6.95. Infant Pack purports to teach simple counting and letter recognition skills. In the first program 10 dull looking, unevenly spaced green bottles appear on the screen and are removed one at a time to the accompaniment of that wretched tune. You are then asked 10 times how many bottles remain on the screen (written in capitals), the number being from 1 to 9. The reward for reaching 10 correct answers is much like a nightmare, the screen filling with lines which seem to fill into a murky brown. The reward is best avoided.

### On the block

The second program, Alphabet is by far the most appalling educational program I have ever come across. It is supposed to teach letter recognition but draws unrecognisable blocked shapes on the screen purporting to be words. The letters drawn on the screen do not join up at the bottom, the middle being an capital E is three times as thick as any other, and peculiar square shapes appear in the middle of blocked letters. The words themselves have very uneven spaces between their constituent letters and the pictures drawn on the screen to exemplify the words are little short of pathetic. To cap it all the text at the end doesn't deal with letter recognition at all but asks questions on alphabetical order. It would do the credibility of Shards as a publisher of serious educational software much good if it withdrew this tape from the market immediately.

Junior Pack is a better proposition containing probably the best tables-tester of those on review. You play against the clock and the questions get harder or easier according to your abilities. The accompanying program is more dubious in worth. It is supposed to encourage word recognition skills but the sentences have a random element, eg "Dave is a strange man. He is a cook" and leave a lot to be desired.

Fun to Learn runs to 185 and is aimed at teaching and reinforcing simple skills in an attractive and entertaining way. Menu-driven, the program consists of five games dealing with initial consonants, anagrams, simple adding on, a hang-man type game and a series of exercises which encourage word-attack skills through codes. This forms a useful package and should do well at £8.95.

### Compendium

Live and Learn is a compendium of programs suitable for juniors and early secondary age children. The first program, Dragons takes you step by step through Dragon high resolution graphics giving examples of each command and using them to create a picture on the screen. You can advance and recap all your own pace. It is disappointing that this is "view only" instruction, no interaction is allowed. It would have been possible to have let the student choose such things as the position of the drawing, the colour of the screen and the size (within limits). This would have been more of a learning experience.

Zoo is a good animal knowledge program. It contains information on 20 animals and for each one a hi-res map can be called on to show its world-wide distribution. There is a "guess the animal" quiz option — you have to be able to spell the names correctly for the computer to recognise your answer.

With Britain the best-drawn map fooled me into high expectations but all it had to offer in the end was a list of the characteristics of countless towns in England, Wales and Scotland. It offers a good example of the abuse of the scroll function. Imagine 20 or so pages of text and each letter accompanied by a piercing beep. I felt I had been dragged around Britain by the ears.

Live and Learn ends with Survivor which is an interesting and safe method of testing your chances of desert survival than the real thing — and Music which consists of a simple tutorial followed by your chance to do a 'Targets on the Oregon keyboard.

So how does your excuse of the lack of educational software hold up now? I have looked at some awful programs, some mediocre and a few good ones. Do any of them suit your needs, and how do you choose? Any serious educational publisher should produce some documentation to go with the software. Schools often select packages by sending first for this literature. They can then make some judgement on its value and decide if it suits their needs. Perhaps parents with home computers should do the same thing. ■

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# Putting some snap into learning maths

*Old Mead shows you how you can encourage your children to learn their times tables – and have some fun into the bargain*

HOME COMPUTERS can be great fun for playing games, but many people buy a mere to use it, among other things, as a teaching aid. It is quite a convincing reason in those early days when you are trying to convince your wife, friends (or even yourself) that you have made a worthwhile investment.

Your micro does have the potential to make learning fun for children, but unfortunately most of the listings in magazines and books are for games. Consequently it can be quite difficult to take advantage of this useful feature of your computer without guidance. This article should help the less experienced programmer — it shows how to construct a simple maths game in which two children compete to be the first to spot the correct answer to sums displayed on the screen.

## Starting . . .

Type in the lines of the program listed with this article in the order they are discussed here. To help you, the various sections of lines are labelled to show where you should add them to your listing.

Start with lines 40-60 which identify the names of the players and give them their instructions. Line 60 uses the `INKEY$` function to keep the instructions on screen until the players are ready to move on. As soon as `C` has a value (that is, when any key is pressed) the program can move on to the next line.

Line 110 generates the sums to be answered. The variable `A` will have a value between 5 and 12, "`A=INT(10/3)+2`" can be thought of as "pick a number from 1 to 10, then add 2 to it", so the range will be from 3 (ie,  $1+2$ ) to 14 ( $10+3$ ). Similarly, `B` will vary between 4 and 12. `C` is the result of multiplying `A` and `B`.

To produce an "answer" to tempt our young players with, we use the `USC$` statement in line 170 (which might need a little explanation. Let us assume, for example, that `A=9` and `B=6`. In which case `C` will of course be 54. Now if you think of "`C=INT(50/3)+C-2`" as meaning "take a number between 1 and 3 (1, 2 or 3), add the value of `C` to it (making 55, 56

or 57 in our example), then take away 2 from this total" you will see that the three possible numbers produced are either 53, 54 or 55. This will work for any value of `C` that our program generates, producing a number which is equal to, one less or one more than `C` itself.

Line 150 now prints the question, 160 tests in a variable (pause and 180 prints the "answer" offered, together with a sound prompt to draw attention to it.

Once the "answer" is on the screen we expect the players to react by pressing a key if the correct answer is being shown. To keep competitiveness and interest at a maximum we will construct our program so that if both children press their key then both presses will be recorded and suitable messages displayed. The quicker child will win, but the slower one will also earn praise if the right key presses are made.

To achieve this, we have to adopt the `INKEY$` function to suit our purposes. The standard `INKEY$` statement (eg `IS=INKEY$`) alone will only record the value of the last key pressed — and would actually identify the slower player as the winner! So we will employ a string array in which we can store the various key presses made. When a key is depressed, its value (which should be the letter "A" or "L" if the players have followed their instructions) will be stored in the array `IS$`. By this method, the first key press can be stored in `IS$(1)` and the second (if any) in `IS$(2)`, so we can easily evaluate who was the fastest.

Enter lines 200-240: Line 200 sets up the `INKEY$` function, and line 210 a `FOR . . . NEXT` loop which effectively scans the keyboard up to 100 times. The first statement in line 220 introduces the string array and means "when a key is pressed, store its value in the next subscript of the array `IS`". Until a key is pressed `J` will equal 0, so the first key press will be stored in `IS$(0)`. In order to keep the program circling through our `FOR . . . NEXT` loop if no key has been pressed, we add the second statement in 220 which reads as "if no letter is yet stored in the current subscript of `IS` then

go directly to line 240", from where the loop will restart.

If, on the other hand, a key has been pressed since the last time the `INKEY$` checked the keyboard then `IS$(J)` will have a value (the letter pressed) and will `NOT` equal 0. It will therefore ignore the `IF . . . THEN` statement and drop through to line 230.

If line 230 is reached it must be because `IS$(J)` has a value stored in it. As this subscript is now "occupied" we add 1 to the value of `J` so that the next key press made can be put into `IS$(1)`. The second statement in this line simply ensures that once two keys have been pressed the program will jump out of the `FOR . . . NEXT` loop, moving the game into the next stage.

Line 250 will only be reached if `J=0` (no keys pressed during the whole run of the `FOR . . . NEXT` loop) or `J=1` (only one key pressed). If `J` does equal 1 the program jumps to line 300: if `J=0` then line 260 will assess whether keys should have been pressed or not. If the answer offered on screen was not the right one the program moves to line 268, gives a short prompt then goes back to line 120 to start the sequence again with a new value for `C`. If the right answer was displayed (ie, `D=C`) then line 270 prints out the missed opportunity to our two budding mathematicians. Line 280 passes, then sends control back to line 100 from where a new series of variables are created.

## . . . block

The next block of lines from 300-450 cover the permutations when only one key has been pressed. Lines 310-370 apply if the right answer was displayed and will congratulate the quick-witted player who pressed, then go to the appropriate sub-routine in lines 400-440 which keep score. If neither "A" nor "L" were pressed then this is picked up in line 370 and line 380 prints a message accordingly. In all cases, the program then goes back to lines 260 and 160 to restart the sequence.

Lines 400-450 point out the error of his ways to a player pressing when he

```

10 REM ***** BY GD READ**
20 B=0:F=0
40 CLS:PRINT# 70,"CODE PATHNAME: ";CODE:PRINT:PRINT
50 INPUT "FIRST PLAYER'S NAME";A$:INPUT"SECOND PLAYER'S NAME";L$
70 CLS:PRINT#PRINT#WHEN YOU SEE THE CORRECT ANSWER:PRINT#TO THE SUM PRINTED ON
SCREEN:PRINT#PRESS YOUR OWN KEY once ONLY:PRINT#AS QUICKLY AS YOU CAN:PRINT
80 PRINT A$;" - USE THE 'A' KEY:PRINT L$;" - USE THE 'L' KEY:PRINT:PRINT#THE F
IRST PLAYER TO SCORE 25:PRINT#POINTS WILL WIN THE ROUND"
90 PRINT $ 440, "PRESS ANY KEY TO START PLAY:"GOTOKEY$IF C$="" THEN 90
100 B=B+1
110 A=ABS(100+2*B-ABS(PI+314*B))
120 FOR J=0 TO 1:FOR I=0 TO 1:NEXT J:I=0
130 CLS:PRINT#102,"score=";PRINT#102,A$:PRINT#104,L$:GOSUB 700:PRINT#PRINT#103
2,104)
140 IF C="25 OR F="25 THEN 340
150 PRINT#106,A$;" 1 100" = "
160 FOR K=10 TO 100:(500+300)/NEXT K
170 D=ABS(51+10+31)
180 IF D<D THEN H=H+1:IF H=4 THEN D=0
190 PRINT#203,D;" .....777"ROUND 210,2:PRINT
200 B=10KEY$
210 FOR K=100:GOTO(21+10)KEY$
220 IF B(10)="" THEN 240
230 J=J+1:IF J=2 THEN 460
240 NEXT K
250 IF J=1 THEN 300
260 IF D<D THEN 290
270 PRINT#1000 YOUR CHANCE:"1:ROUND 1,4:PRINT#1;"is EQUAL TO";A$;" B";D
280 FOR K=1 TO 100:NEXT K:GOTO 100
290 PRINT#440,"READY?...":SOUND 160,4:GOTO100
300 IF D<D THEN 400
310 PRINT#TIME UP:"1:SOUND 1,4:PRINT#KEY CORRECTLY PRESSED BY:" =
320 IF B(10)="A" THEN PRINT A$:GOSUB750:GOTO380
340 IF B(10)="L" THEN PRINT L$:GOSUB940:GOTO380
370 GOSUB 750:GOTO 380
400 PRINT#B" YOU SHOULD NOT HAVE PRESSED"
410 IF B(10)="A" THEN PRINT A$:GOSUB750:GOTO450
420 IF B(10)="L" THEN PRINT L$:GOSUB 940:GOTO450
430 PRINT#BUT IN ANY CASE....."
440 SOUND 20,3:PRINT#WRONG KEY PRESSED"
450 FOR K=100:GOTO(10+10)GOTO380
460 IF B(10)=H(10) THEN 520
470 SOUND 20,3:PRINT#SAME KEY PRESSED TWICE"
480 IF B(10)="A" THEN PRINT A$:GOSUB750:GOTO380

```

4. Shouldn't lines 880 and 890 reduce the score. Again, if the key was not 'A' or 'L', this is dealt with in line 430.

Lines 480-690 cover the play when both keys have been pressed (check back to line 230 if you are unsure about this). First of all we have to discourage the smart A&L who might try and get extra points by pressing his own key twice so as to exclude the other player. This is done by lines 480-510 which flip the processor's keyboard and then increase the other player's score. Line 500 only resets if the twice pressed key was neither 'A' nor 'L'.

Once this has been checked out, lines 520-610 sort through the contents of B\$ to decide who was first (the player whose letter is found in B\$(0), second B\$(1), and whether any other keys apart from allowed ones were pressed. Although lines 530-610 may seem complex at first, if you have played with me so far and understood how the earlier lines 300-430 did their job, you should have little difficulty seeing how this section carries out its tasks too. Lines 520-540 analyse the first press and 580-610 process the second.

In lines 620-700 action is taken if both

players pressed when they shouldn't have. In this case it doesn't really matter who pressed first as both players are penalised equally, but as we have the information we may as well display it on screen! Lines 680 and 700 detect if an invalid key was pressed.

### Loose ends

Now to tidy up a few loose ends. Line 80 resets the scores to zero at start of play. Line 100 ensures that the array B\$ is empty before each new display is made (if we didn't do this, late presses made during one display might be read as a very late press on the next). Line 140 checks the scores and jumps to the 'winner' sequence if either player has reached 25 points.

The sections we have covered so far are the backbone of the program. The remaining lines add some sound and action. Line 100 is a simple screen display of the player's names and scores. Lines 760-790 (PQRS) a bit of attention over Player 1's name if he scores (if the other player is penalised) and line 280 updates the score on screen. Lines 860-880 do the same for

the other player. In lines 840-880 the winner is announced with a small fanfare and flashing lights.

Line 180 prevents the game from getting hung up on one sum by counting how many consecutive wrong answers are generated in line 170. It then ensures that by the fourth display the right answer will be offered. Line 190 resets this counter to zero.

Depending on the children involved, the pleasure of being the winner may be muted enough — but in my experience this won't last long and more amusement may be necessary to keep them at it. One good way of achieving this is to let the winner play a round or two of an arcade-type game before the program reverts to the question and answer routines. You can use any game program written in Basic for this (or Turbo, elsewhere in this issue, as explained below).

Enter lines 900-920, filling in the name of the arcade game. The demand for the winner's name is really only a bit of showmanship for the winner and could easily be by-passed.

Now carry out the following steps

```

490 IF B=101="L" THEN PRINT L4:GOSUB 930:GOTO280
500 GOTO430
510 IF B<>C THEN 430
520 PRINT"FIRST KEY PRESSED WAS..."
530 IF B=33="A" THEN PRINT A4:B=0+3:GOSUB 740:GOTO290
540 IF B=32="L" THEN PRINT L4:F=2+3:GOSUB 800:GOTO290
550 GOSUB 750
560 IF B=33="A" THEN PRINT B3B4:A4:B=0+3:GOSUB 740:GOTO260
570 IF B=32="L" THEN PRINTB3B4, L4:F=4+1:GOSUB 800:GOTO260
600 PRINTB3B4,"SECOND KEY..."GOTO 370
610 PRINTB416,"WAS THE SECOND TO PRESS"IGOTO280
620 PRINT"YOU ARE BOTH WRONG"
630 IF B=33="A" THEN PRINT A4:GOSUB 950:GOTO670
640 IF B=32="L" THEN PRINT L4:GOSUB 960:GOTO670
650 GOSUB 750
670 PRINTB3B4,"AND SECOND PRESS WAS..."
680 IF B=111="0" THEN PRINTB416, A4:GOSUB 950:GOTO270
690 IF B=111="L" THEN PRINTB416, L4:GOSUB 960:GOTO270
700 GOSUB 750:GOTO280
720 SOUND 12,4:PRINT"WRONG KEY PRESSED":RETURN
740 FOR I=0TODT
750 POKE 1024+I,42:GOSUB 200,2
760 NEXT I
770 GOSUB 980:RETURN
800 FOR I=0TODT
810 POKE 1055+I,43:GOSUB 200,2
820 NEXT I
830 GOSUB 980:RETURN
840 CLS 3:PRINTB46," "
850 FOR I=1TOD4:GOSUB 140,3:PRINTB46,"  XXXX A WINNER!  XXXX"NEXT I
860 PRINT:PRINT:PRINT"AND THE WINNER IS ...":PRINT
870 PLAY "T14V25044L200308DFCCDFD0004BL2C"
880 IF C#F THEN PRINT A4:B#B4 ELSE PRINT L4:B#L4
890 FOR K=1TODTODINEED K
900 CLS:PRINT"THE WINNER OF THIS ROUND"PRINT"HAS EARNED A GAME"PRINTOF "*****
***** "PRINT:TYPE IN THE WINNER'S NAME TO"PRINT"START THE GAME - OR TYPE I
N THE"PRINT"WORD"PATHS"FOR ANOTHER GAME"PRINTOF "another"PRINT
910 INPUT "NAME.....":J46
920 IF A#B4 THEN 300:ELSE IF A#="PATHS" THEN 30 ELSE SOUND 10,7:GOTO 900
930 B=0+3:GOSUB740:RETURN
940 F=0+3:GOSUB 800:RETURN
950 B=0+1:GOSUB 900:RETURN
960 F=0+1:GOSUB 740:RETURN
980 PRINTB72,4:PRINTB80,F:RETURN

```

1. **SAVE** "Mathsag" on to a tape.
2. **CLOAD** your chosen arcade game.
3. **RENUM** the arcade game, making the first line number 1000 — see page 43 of *Dragon* handbook.
4. **SAVE** the now renumbered arcade game on tape.
5. **CLOAD** "Mathsag".
6. Use the immediate mode (ie, type in these instructions directly without line numbers, then press **ENTER**). The quotation marks are to clarify only — don't type them in. Type **"PRINT PEER25:PEER20"** and then press **ENTER**.
7. Make a note of the two numbers that appear on screen.
8. Type **"PRINT PEER26"** and **ENTER**.
9. If the latest number is greater than 1 then type **"POKE 25, PEER27"** : **POKE 26, PEER28** — 2". Otherwise type **"POKE 25,PEER27** — 1 : **POKE 26, 256 - PEER28"**.
10. **CLOAD** the renumbered arcade game.
11. In the immediate mode, type **"POKE 25,"** and then type in the first number from instruction 6, **ENTER** this. Now type **"POKE 26,"** and the second

number from instruction 6, **ENTER** this.

If you have followed the above instructions exactly you will have merged the two programs into one.

All that remains is for us to add the lines that will ensure that once our winner has had the allotted period on the arcade game the program will return to the maths game. This can be done in a number of ways and I offer you two.

### Back to maths

Firstly, find the line in the arcade game (if any) that gives the player the choice of playing again. Alter this line to read **INPUT "ANOTHER GAME (Y/N),25=F 26=I" THEN RUN ELSE END**.

Alternatively, use the **TIMER** function and insert an additional line in the maths program.

915 **TIMER=0**

Find a line in your arcade game which is also actioned as the program runs (eg, one that updates the score) and insert these two statements in it **T1=TIMER** : **IF T1>7000 THEN 5000**. Finally, add new line 5000:

```
5000 CLS:PRINT"TIME UP"MS:FOR K=1 TO 100: NEXT: GOTO 30
```

It's close by offering some variations. Add the following lines:

```
MS 51=INT(5):ON 51 GOTO 164,170
164 52=INT(3): IF 52=1 THEN
D=C-B:GOTO 180 ELSE IF 52=2
THEN D=C+B:GOTO 180 ELSE
D=C:GOTO 180
```

which will randomly produce a different series of possible "answers". Increase display time (reaction time) by increasing the number in line 210. To have a new suit generated each display, amend the last figure in line 280 from "120" to "100". Alter display time of screen messages by changing the numbers in lines 280 and 480.

You have then the makings of a first-class competitive maths game — it's over to you now to enhance it with sound and colour, animation and variety. Remember the two key points for a successful children's program — keep it lively and always reward a good effort!

If you want to contact me, write to Thatchover Cottage, School Lane, Middleton Secory, Oxon OX4 6SW. ■

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```

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```

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When an arrow key is pressed the simple graphic signman will pull his lever and the points reset. But just to make life difficult, each time one set of points are changed, all the others change in a similar manner. There are two concessions, though, trains may overtake and pass from opposite directions. I didn't want to make the game totally impossible.

A second of time, in approximate seconds, is kept and constantly updated on the screen as well as the current best time (labeled BT).

The program begins with a colourful Tracker logo display followed by a brief text of instructions. The user is requested to select between two and six trains or opt for the demonstration mode. I suggest you select two trains at first until you are familiar with the method of resetting the points. In the computer demonstration mode the computer plays using five trains and never loses track of any of them. ■

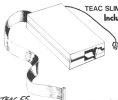




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# Easy animation

MOST OF THE home micros available now are capable of some form of animation, the Dragon 32 being one of the leaders in the field. On all micros there are various ways of achieving animation, although the Dragon has more than most. In this article we will concentrate on two methods of obtaining movement.

## The simplest way

The first of these is the simplest way possible—using the text screen. Although written for Dragon 32 machines, this set of programs should run on most computers, with only slight changes.

Let us start by displaying on screen the "star" of our epic:

```
10 CLS
20 Y=1
30 PRINT "★"
```

If we now add the lines 40 Y=Y+1 and 50 GOTO 30 we have a line that flashes across the screen. By adding a space before the "★" in line 30 we can blank out the last "★" and give the illusion of movement (line 30 should now read 30 PRINT "★"). All this happens rather quickly, so let us rewrite our program to slow things down.

```
10 CLS
20 FOR Y=1 TO 20
30 PRINT "★"
40 FOR X=1 TO 100:NEXT X
40 NEXT Y
```

## The star's comeback

Our next problem is to bring our "★" back again. This can be done with the lines:

```
60 FOR Y=30 TO 1:STEP -1
60 PRINT "★"
70 NEXT Y
80 GOTO 40
```

**Dave Windle** introduces the basics of animation for the Dragon and shows just how easy it can be

The program, as it stands, deals fairly well with movement in the horizontal plane, so how about vertical movement? This is quite possible on the TEXT screen, if slightly more complicated. Using our original program, altered to read:

```
10 CLS
20 FOR Y=440 TO 0:STEP -20
30 PRINT "★"
40 FOR X=1 TO 100:NEXT X
50 NEXT Y:GOTO 40
```

We have to be off. However this time, our existing SPACE will not work. So we have to find another means of removing the last "★". Using CLS will work, of course. Try changing line 50 to 50:CLS:NEXT and we now have vertical movement. Using CLS is not much good, though, if you have anything else on the screen that you need to keep. Add the lines:

```
5 CLS:PRINT "202:gone"
7 FOR X=1 TO 500:NEXT X
35 PRINT "204:BLINK"
```

for a demonstration of some of the problems. We need then to find another way of erasing our "★". What we need to do is print a space immediately below the NEXT print position, in other words in the space occupied by our "★" before the current cycle of the loop.

To do this we need to alter our program once more:

```
10 CLS
20 FOR Y=440 TO 0:STEP -20
30 PRINT "★"
```

```
40 FOR X=1 TO 100:NEXT X
50 PRINT " ";
60 FOR X=1 TO 100:NEXT X
70 NEXT Y
```

Now we have achieved movement in both planes. Let us now finally rewrite the program to demonstrate a lot more graphically what we have learned.

```
10 CLEAR(1) = 204:"MODULE":
20 FOR Y=440 TO 0:STEP -20
30 PRINT "★";GOSUB 80
40 PRINT "★";GOSUB 90
50 NEXT Y
60 FOR Y=0 TO 30
70 PRINT "★";GOSUB 80
80 NEXT Y:GOSUB 90
90 FOR X=1 TO 100:NEXT RETURN
```

As you can see from running the program it is not finished. Using the information contained in the earlier listings see if you can complete the movement across the screen.

## Method No. 2

Let us now look at another method of animation. This time we will use Dragon's excellent DRAW command.

The following program DRAMS is a figure on the screen, clears it and then DRAWs a slightly different figure a few points forward. The program is quite simple and the following notes will help you to understand its workings.

## Program notes

10-30	Set MODE and SCREEN
40-80	Creates STRINGS to DRAW figures
90-310	Makes SOUND and controls DRAWings
320	Loops back to start. ■

```
5 "MALLMAN" DAVE WINDLE AUG 83
10 PROC24,1:SCREEN,1:PCLS:REM 3
20 DIM LA(20,30)
40 RS="SGSGR209R209L202L402L1R
172R404L2030SGSGR4L18RGR3P6L3"
60 LS="SGR209R219L203R214L21R
103R44R203P5R504L18R6R306L3"
80 M="SGR209R209L203R21402L1R10
284R40L2010GLR306P6L3"
70 DRAW"BM220,90"+L4
80 SOUND3,1
90 FOR X=1 TO 200:NEXT
100 PCLS
110 DRAW"BM200,90"+M5
110 SOUND5,1
120 FORK=1 TO 200:NEXT
130 PCLS
140 DRAW"BM100,90"+R8
140 SOUND1,1
150 FOR X=1 TO 200:NEXT
160 PCLS
```

```
170 DRAW"BM140,90"+L4
170 SOUND6,1
190 FORL=1 TO 200:NEXT:PCLS
200 DRAW"BM140,90"+M5
200 SOUND1,1
210 FORK=170000:NEXT:PCLS
220 DRAW"BM120,90"+R8
220 SOUND5,1
230 FORK=170000:NEXT:PCLS
240 DRAW"BM100,90"+L4
240 SOUND1,1
250 FORK=170000:NEXT:PCLS
260 DRAW"BM80,90"+R5
260 SOUND5,1
270 FORK=170000:NEXT:PCLS
280 DRAW"BM60,90"+R5
280 SOUND1,1
290 FORK=170000:NEXT:PCLS
300 DRAW"BM40,90"+L4
300 SOUND5,1
310 FORK=170000:NEXT:PCLS
320 GOTO60
```

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T3DFDH

# Getting down to small business

There's more to the micro than playing games! — Margaret Norman explains some of the methods and applications of data storage and manipulation

**MOST HOME** computer games bought their micros in the belief that they would be able not only to play games on them, but also use them to keep track of their bank accounts, look after their files and so on. Here is a program which I hope will make it easier for you to do some of these things, by showing you how to store and manipulate data.

This program has been written to hold the names of a number of items, further brief descriptions (eg the category to which each belongs) and an associated numeric value. It can calculate the total numeric value of various numbers of different items for you. There are several possible applications for a program like this: it could be used to calculate the value of stock in a small shop; by entering the names of items stocked and their prices; or even to calculate the calorie content of a meal, by entering names of foods and their calorie values.

## File structure

It could also be used just as a simple file for, say, names, addresses and telephone numbers — you can just ignore the part of the program which performs the calculations, or remove it by deleting lines 260 and 5800 to 5150, changing the number 5 in lines 270 to 290 to 4, and erasing the number 5800 from line 300.

The first stage in writing such a program is to determine the structure of the file to be used, the number and type of data fields and the maximum number of records that can be handled. The number of records which can be held in memory at once obviously depends on the number of fields in each: the more fields, the less records you can have. The data is held in arrays; here a string array is used for the first two fields, and a numeric array for the third. It would be possible to hold all the data in a string array, using the VAL function where calculations are to be performed, but if it is known that calculations will be required it is more efficient to use one numeric array.

## Alphabetical order

If you are unsure how many records your file will hold, you can find out by trial and error; put a fairly large number in the data statement at the start of the program, then keep entering data until you get an O/E error. PRINT N will then give you the number of records it took. If you do this, remember to record the data at regular intervals so you don't lose it all.

The records are arranged in alphabetical order by the sort routine in lines 2050 to 2120. A very simple sort has been used, which will place records in the file fastest if they are entered already in alphabetical

order. For data which is likely to be entered in a random order, a more complex sort routine, such as a binary sort, would be quicker. It would be a simple task to change the routine so that records are filed according to the numeric value rather than the name of the item — just change every occurrence of A\$(X) in this section to A(X).

## Deciding options

Once you have structured the file, the next job is to decide which options you want to have available to the program user. Obviously you will need to be able to enter new data, to save the data on tape and to load it again (there is little point in having a file if you cannot also examine it). An option to delete entries is also fairly essential — here it has been combined with the examine data option. If your records are fairly long ones it may be desirable to include an option to alter the data in individual fields — here, changes can only be made by deleting them, re-entering a complete record. You may also want to be able to search for all the records containing a given string; use the INSTR function for this.

The option to load an existing file from tape is given at the beginning of the program, as this can only be done at the start. All other options are presented in ■

```
10 REM ADDFILE
20 REM BY MARGARET NORMAN
30 CLEAR 1:CLR# 00000
40 DIM A$(400),D(1,4000)
50 CLS#
60 PRINT#204,"ADDFILE"
70 FOR DL=0 TO 1000:NEXT
100 CLS
110 INPUT"DO YOU WISH TO LOAD EXISTING DATA FILE FROM TAPE?";D1
120 IF D1="Y" THEN 1050
200 REM WITH OPT1042
210 CLS
220 PRINT#37,"OPTIONS AVAILABLE:";PRINT
230 PRINT"1) ADD NEW DATA TO FILE"
240 PRINT"2) EXAMINE/DELETE DATA IN FILE"
250 PRINT"3) SAVE FILE ON TAPE"
260 PRINT"4) CALCULATION"
270 PRINT"5) STOP"
280 PRINT;INPUT"ENTER VOL. BETWEEN 1 AND 5";OPT
290 IF OPT=1 OR OPT=5 THEN 390
300 ON OPT GOTO 3050,3000,4000,5000,350
350 CLS;PRINT#260,"*****BYE*****"
1000 REM LOAD FILE FROM TAPE
1050 CLS;PRINT"FROM TAPE IS READY,PRESS ENTER";;INPUT D1
```

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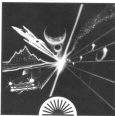


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```

1030 OPEN "1",2-1,"APP"
1035 INPUT 4-1,N
1040 FOR I=1 TO N
1050 INPUT 4-1,AB(I,1)
1060 INPUT 4-1,AB(I,2)
1070 INPUT 4-1,AB(I):NEXT I
1080 GOTO 200
2000 REM NEW DATA TO FILE
2010 IF N=0 THEN CLS:PRINT#205,"FILE IS FULL",FOR DL=0 TO 1000:NEXT:GOTO 200
2020 CLS:INPUT#NAME OF ITEM:AB(N+1,1)
2030 INPUT "DESCRIPTION":AB(N+1,2)
2040 INPUT "VALUE":AB(N+1)
2050 IF N=0 THEN 2120
2060 FOR I=N+1 TO 1 STEP -1
2070 IF AB(I,1,1)=AB(I,1) THEN 2120
2080 TB(I)=AB(I+1,1):TB(I,2)=AB(I+1,2):TB(I)=AB(I+1)
2090 AB(I+1,1)=AB(I,1):AB(I+1,2)=AB(I,2):AB(I+1)=AB(I)
2100 AB(I,1)=TB(I):AB(I,2)=TB(I):AB(I)=TB(I)
2110 NEXT I
2120 N=N+1
2130 CLS:INPUT#ANY MORE NEW DATA (Y/N):DN
2140 IF DN="Y" THEN 2010 ELSE 200
2000 REM EXAMINE/DELETE DATA
2010 CLS
2020 PRINT#DO YOU WANT:"
2030 PRINT#(1) THE WHOLE FILE"
2040 PRINT#(2) A PARTICULAR ENTRY"
2050 PRINT:INPUT#ENTER 1 OR 2":X
2060 IF X<1 AND X>2 THEN 2000
2070 IF X=1 THEN I=1:GOTO 3140
2080 REM FIND ENTRY
2090 CLS:INPUT#ENTER NAME":S
2100 FOR I=1 TO N
2110 IF S=AB(I,1) THEN 3140
2120 NEXT I
2130 CLS:PRINT#THIS ITEM IS NOT IN FILE",FOR DL=0 TO 1000:NEXT:GOTO 200
3140 CLS:PRINT#AB(I,1):PRINT AB(I,2):PRINT "VALUE: ";AB(I)
3150 PRINT#PRINT#DO YOU WANT TO:"
3160 PRINT#(1) DELETE THIS ENTRY"
3170 PRINT#(2) EXAMINE NEXT ENTRY"
3180 PRINT#(3) SELECT NEW OPTION"
3190 PRINT:INPUT#ENTER 1,2 OR 3":Y
3200 IF Y<1 OR Y>3 THEN 3190
3210 ON Y GOTO 3240,3250,3000
3220 IF Y=1 THEN I=I+1:GOTO 3140
3230 CLS:PRINT#205,"END OF FILE",FOR DL=0 TO 1000:NEXT:GOTO 200
3240 REM DELETE ENTRY
3250 IF I=N THEN 3280
3260 FOR J=I TO N-1
3270 AB(J,1)=AB(J+1,1):AB(J,2)=AB(J+1,2):AB(J)=AB(J+1):NEXT J
3280 N=N-1
3290 CLS:PRINT#ENTRY DELETED":PRINT
3300 PRINT#DO YOU WANT TO:"
3310 PRINT#(1) EXAMINE NEXT ENTRY"
3320 PRINT#(2) SELECT NEW OPTION"
3330 PRINT:INPUT#ENTER 1 OR 2":Z

```

■ a menu, to which the program returns, when each task has been completed.

The routines which handle the saving and loading of data in tape have been simplified by making the first entry in the tape file the number of records in the file; this means there is no need to use an end-of-file marker. The program pauses at the start of these routines (wait for ENTER) to be pressed to give the user time to position the tape and put the recorder in the correct mode. You could if you wish insert a MOTOR ON command to facilitate the positioning of the tape.

The section of the program which performs the calculations is also very simple.

You are asked for the name of an item; the appropriate file entry is found, then the description and value are printed and you are asked for the number of these items. The computer then calculates the value of this number of items and gives you this figure and a running total. If the name you have entered is not in the file you are informed of this and asked for another. This is important as the filed names are only checked for an exact match with the word you have entered, so if you spell the name differently the appropriate entry will not be found.

All programs involving the use of data files should be crashproofed as well as

possible, to minimise the risk of data being lost. Every request for input should be accompanied by a clear indication of the form in which it is required, and followed by a check to see that it does fall within the required range, especially if it is to be used in an GOTO ... GOTO statement. There are plenty of examples of how to do this, eg lines 260-280 check the selection of an option from the main menu. All selections of options in this program are checked in this way, but no checks are made here on the actual data in the files. If you are writing, say, a financial program where typing an extra zero by mistake could prove costly, it is obviously worth in-

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# Recovering from i/o errors

Pam D'Arcy shows how to sort out your tapes with Tapescan

IN PRACTICALLY EVERY issue of any computer magazine are commonly read complaints about the lack of a really useful tape for the Dragon. I have not worried too much about this as there are means of recovering it. The lack of a tape catalogue facility makes this difficult, again, so TAPESCAN can be used to check that the tape content matches one's records.

My pet outrage is the way that everything grinds to a halt on detection of an I/O error. The biggest drawback for me is that this throws most attempts at cutting down on loading time by fast-winding tapes to an approximate position. Brief encounters on a BBC machine show that all blocks within their files are numbered, the blocks are identified as they are passed/loaded and, having been informed of an I/O error, you are allowed to reposition the tape to attempt a re-read of the (problem) block if it occurred during loading.

The Dragon gives you no idea of how far you are through the current file, be it one being loaded or stopped, so my usual trick of "STOP" until the tape reaches the start of the next file may need to be typed in only a few times — or so many times that I give up and rewind the whole tape back and start again anyway!

Having received the Dragon Data "Information for Machine Code Users" leaflet (and armed with tape layout information in CoCo's Technical Reference Manual), I set about writing a tape listing program with two main criteria:

1. Recovery from I/O errors to allow faster tape positioning.
2. It should be machine coded so that it could be permanently resident in the Dragon and be used without affecting any other program currently loaded (notably, Basic).

The resulting machine code listing,

Tapescan, is published with this article. It doesn't assist with CLOAD/SAVEFF and program rewrites errors in that it is not intercepting any of those routines — but it is there to assist with checking the tape(s) alongside other programs when you may be experiencing problems.

Tapescan can be entered directly using the TOPSY program featured in the June issue. My initial entry took only about 20 minutes, including checking out my own coding queries.

Or you can use the Beta can loader which is also published here.

Full details of its use and technical details now follow. Information on the tape file formats can be ascertained from the listing.

Between files, the cassette motor is switched off for approximately three seconds. If no key is pressed in this time, the run continues; if Q is pressed, the run is terminated. Pressing any other key leaves the motor switched off until another key is pressed (Q will again quit the program), enabling tapes to be changed or the screen display to be studied.

If a read error is detected, the program resumes by hunting for a file header block. As data blocks containing binary information (eg CSAVE, CSAYOM files) are stored without inter-block gaps, obviously, depending on where within a file the

```

1 REM SETSCAN - ©1984 PAM D'ARCY
2 REM JUNE 1985
3 CLOAD/SAVE, CLOAD/SAVEFF, CLOAD/SAVE
  TER=410
4 CLS:PRINT"SETSCAN PROGRAM"
5 PRINTPRINT"SETSCAN LOADS THE
  TAPESCAN MACHINE CODE FROM
  AN AREA IN STORED NEXT ON THE
  6 TAPE THEN ALLOWS YOU TO COPY
  BOTH PROGRAMS TO ANOTHER TAPE
  "
7 PRINTPRINT"ENTER SAVING THE
  PROGRAM, A NUMBER OPTION 1
  8 AVAILABLE TO ENABLE THE REDE
  FINE TAPE TO BE POSITIONED CORRE
  CTLY BEFORE COMMENCE SAVING"
9 FOR N=1 TO 7999:NEXT
10 PRINTPRINT"LOADING TAPESCAN"
11 CLS:PRINT"SETSCAN PROGRAM"
12 PRINT
13 PRINT"PRESS Q TO QUIT, R TO R
  ECOVER (TO POSITION TAPE PRIOR
  TO SAVING PROGRAM), OR
  ANY OTHER TO COMMENCE SAVING"
14 REM=END/YES:IF R="" THEN R=4
15 IF R="Q" THEN THEN CLS:END
16 IF R="R" THEN 22
17 RETURN
18 PRINTPRINT"RECOVER IS NOW ON"
  PRINTPRINT"PRESS Q TO QUIT PROG
  RAM, OR ANY OTHER KEY T
  O HALT MOTOR"
19 REM=END/YES:IF R="" THEN R=4
20 RETURN
21 IF R="Q" THEN THEN CLS:END
22 CLS:PRINT"SETSCAN PROGRAM"

```

```

23 PRINTPRINT"PRESS Q TO QUIT &
  USE PUT RECOVER INTO "RE
  CODE" MODE AND PRESS ANY OTHER 1
  3 COMMENCE SAVING"
24 REM=END/YES:IF R="" THEN R=4
25 IF R="Q" THEN THEN CLS:END
26 CLS:PRINT"SETSCAN PROGRAM"
  PRINTPRINT"SAVING PROGRAMS NOW"
27 CLS:PRINT"SETSCAN"
28 CLS:PRINT"SETSCAN, RECOVER, AND/OR
  CENTER-1, RAM"
29 PRINTPRINT"PROGRAMS JUST SAY
  GO"
30 PRINTPRINT"TAPE RECOVER OUT
  OF RECORD MODE"
31 PRINTPRINT"VERIFICATION OF S
  AVE REQUIRED"
  REM=END/YES:IF R="" THEN R=4
32 REM=END/YES:IF R="" THEN R=4
33 IF R="Q" THEN THEN CLS:END
34 IF R="R" THEN 11
35 CLS:PRINT"SETSCAN PROGRAM"
36 PRINTPRINT"VERIFICATION OF S
  AVE REQUIRED"
37 PRINTPRINT"SETSCAN WILL NOW
  BE ENTERED"
  REM=END/YES:IF R="" THEN R=4
38 IF R="Q" THEN THEN CLS:END
  REM=END/YES:IF R="" THEN R=4
39 CLS:PRINT"SETSCAN PROGRAM"
  PRINTPRINT"PRESS Q TO QUIT AND OTHER TO C
  ONTINUE"
40 REM=END/YES:IF R="" THEN R=4
41 IF R="Q" THEN THEN CLS:END
42 CLS:END

```

Setscan loader - for loading Tapescan

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Address	Object code	Op	
7040 28 88	88A	17040	
Press data area, file			
7054 04 41 28 40	704	17054,17070	
7057 42 41 40	702	17057	
7067 88	702	17067	
Program, clear screen			
7068 88 48	108	17068	
7069 88 84 88	108	17069	
706a 9F 88	87F	1706a	
706F 47 88	87A	1706F	
7071 8C 88 88	0FFC	17071	
7074 24 7F	88C	17074	
Screen cleared, display BCR			
7075 58 8C 84	108A	17075,7F	
707F 44 88	10A	1707F	
707B 87 8F	17F	1707B	
707E 84 7F	8804	1707E	
707F 8C 88 8C	108	1707F	
7080 04 88	8888	17080	
7084 27 7C	88C	17084	
Using compiler			
7084 28 8C 81 77	108A	17084,7C	
708A 9F 78	87F	1708A	
708C 28 28	88A	1708C	
Bitshift, pause between files of about 3 seconds to allow user to talk			
708E 8C 48 88	10A	1708E	
7091 8C 88 88	108	17091	
7094 81 88	0FFA	17094	
7095 24 98	88C	17095	
7098 38 1F	108A	17098	
709A 24 78	88C	1709A	
709C 28 18	88A	1709C	
Any pressed - Null			
709E 81 81	0FFA	1709E	

Initial error occurred, more errors may be reported before the start of the next file is detected. One important thing is that the program keeps going!

During the "motor off" time, you can of course take the recorder out of load mode and skip along the tapes forwards/backwards as desired.

The screen display is as follows: FILE-NAME — the eight-character name that the file was created with; TYPE — B (Basic), Q (Data) or M (machine code) file type; ASCII FLAG — A if it is a Basic file saved in ASCII format (C84E...A option); BLOCK COUNT — the count of the number of DATA blocks between the

709E 24 81	88C	1709E	
Exit from program requested			
70A2 2F	87F		
Wait for another key to be pressed before processing			
70A3 8C 88 8A	108	170A3	
70A4 81 88	0FFA	170A4	
70A8 27 7F	88C	170A8	
Key pressed			
70A8 84 81	0FFA	170A8	
70AC 27 7F	88C	170AC	
Start block of a new name expected file header block (previous - BCF) or (initial) after read error			
70AD 8C 88 28	108	170AD	
70B1 4C 7F 48 8A	108	170B1,170B5,170B9	
70B5 8A 81	108	170B5	
70B7 27 84	88C	170B7	
Read error occurred			
70B7 8A 78	10A	170B7	
70B8 28 8A	88A	170B8	
Block free read			
70B8 24 7C	108	170B8	
70B9 27 18	88C	170B9	
File name block			
70C1 98 4F	10A	170C1	
Output the error message			
70C3 24 8A	88A	170C3	
70C3 8C 88 18	108	170C3	
70C8 8A 88	10A	170C8	
70CA 8C 88 8C	108	170CA	
70CD 38 8C	FILE A		
70CF 8C 88 8C	108	170CF	
70D2 38 8C	FILE A		
70D4 17 81 8C	108A	170D4	
70D7 28 88	88A	170D7	
Process namefile block			
70D9 8A 8C	10A	170D9	
70DB 8C 88 8C	108	170DB	
Display name of file			

Header block and any BCF block (if any), displayed in hex; BCF FLAG — displays an upward arrow symbol if a separate BCF block is present; ASCII55555 (if machine code file) — load and start in hex.

Error codes (displayed in reverse screen) are:

0 — Error occurred (it is followed by the error code returned by the Basic read subroutine displayed in hex; the only error mentioned in the grey Oregon Data loader is a checksum error on the block).

1 — Null — Header block when expected (up at the start of a run and will undoubtedly occur when reading past blocks) following an I/O error; it is followed by the block

70DE 9C 78	10A	170DE	
70DE 8A 88	108	170DE	
70E2 8A 88	10A	170E2	
70E4 8C 88 8C	108	170E4	
70E7 8A	8808		
70E8 24 78	88C	170E8	
Display file type (BC = Basic, CF = Data, BCF = BCF)			
70E8 8A 78	10A	170E8	
70EC 8C 88 8C	108	170EC	
70EF 8A 84	10A	170EF	
70F1 47 88 81 88	87F	170F1,7F	
Convert it from alpha character			
70F5 88 4C	888A		
70F7 81 4C	0FFA	170F7	
70F8 27 88	88C	170F8	
70FB 88 81	888A	170FB	
70FD 8C 4A	0FFA	170FD	
70FF 27 4C	88C	170FF	
70B8 8A 4C	10A	170B8	
70B8 8C 88 8C	108	170B8	
Display if ASCII format Basic file after block char			
70B8 8A 81	108	170B8	
70B8 8C 7F	0FFA	170B8	
70BA 24 88	88C	170BA	
70BC 8A 4C	0FFA	170BC	
70BD 24 84	88C	170BD	
70B8 8A 41	10A	170B8	
70B8 28 8C	88A	170B8	
70B8 8A 88 8C	108	170B8	
Save inter-block gap file (B) - continuous data binary, FF = gaps, with synch = ASCII data			
70B7 4A 8C	10A	170B7	
70B8 47 88 88 88	87F	170B8,7C	
Save mc addresses in name block			
70B7 8C 8C	108	170B7	
70B8 8C 88 87	87C	170B8,7C	

type actually read, displayed in hex (B1 Data block; BCF BCF block).

1 — Header block occurred before the previous file had been correctly terminated (a BCF block missing, perhaps when a program had failed while writing a data file and the file was not closed).

Tapecon occupies 675 bytes of storage, including a 255-byte input buffer, thus the highest address that it can be loaded at is 30000 (hex 7D80). That is why the addresses in the simulated machine code listing start at this address. This acts as a more than useful guide when entering the program using Teosy as if you give that address as the start address for the

# screenplay

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Name (BLOCK CAPITALS PLEASE)

Address

Signature

7025 00 00	LDI	#0, r1
7026 00 00 00 0F	STB	>70FA, PC
<i>Clear and display block count</i>		
7026 04 00	LDA	#400
7029 47 00 00 03	STW	>70FE, r0
7031 17 00 04	LDRD	>7034
7034 20 00	BRW	>7036
<i>Check if space wanted (space flag = 0)</i>		
7034 04 00 00 05	LDR	>703F, PC
7034 01 FF	CMPL	#0xFF
703C 04 01	BEQ	>7041
703E 00 00 01	JBR	#0001
<i>Get expected data on EOP block</i>		
7041 40 0F 40 04	STB	>400041
7043 04 01	LDA	#01
7047 07 4C	BEQ	>7048
<i>Read error occurred</i>		
7048 00 00 10	JBR	#0010
704C 04 70	LDA	#70
704E 00 00 00	JBR	#0000
7051 04 01	LDA	#01
7053 4F 00 04	LDRD	>7054
7054 04 70 00 04	LDR	>7060, PC
7054 01 00	CMPL	#00
705C 10 04 FF 0E	LDRD	>706E
<i>Write file into being read - output addresses</i>		
7064 00 4C	BEQ	>70C4
706C 04 FF 04	LDRD	>706E
<i>Error file read</i>		
706C 04 7C	LDA	#7C
706F 04 14	BEQ	>7070
<i>File header block without previous file opening byte complete</i>		
706F 04 40	LDA	#40
706E 00 00 0C	JBR	#000C
706E 04 00 00 0C	LDR	>706E, PC
7072 01 00	CMPL	#00
7074 10 04 FF 41	LDRD	>7074
<i>Failed on my file - output my addresses</i>		

7078 00 3F	BEQ	>7079
7078 14 FF 0C	LDRD	>7079
<i>Valid data EOP block</i>		
707D 01 FF	CMPL	#0xFF
707F 2F 22	BEQ	>70A0
<i>Data block - increment and display block count</i>		
7081 90 00	LDR	#00
7083 30 10	LDRD	>#0, r1
7085 9F 00	STB	#00
7087 04 0C 74	LDR	>70FE, PC
708A 40	LDCA	
708B 47 0C 70	STB	>70FE, PC
708E 00 04	BEQ	>7094
<i>Write file on at end if block length &gt; 255</i>		
7094 04 00 40	LDR	>7094, PC
709D 01 00	CMPL	#00
709E 00 04 FF 70	LDRD	>709E
709F 04 7C	LDA	#7C
709F 01 FF	CMPL	#0xFF
709D 07 4C	BEQ	>70A1
<i>Write file under the separate EOP block</i>		
709F 04 20	LDR	#20
70A1 00 20	BEQ	>70A5
<i>EOP block read (if my file length is integral or 255 bytes, treat as EOP block)</i>		
70A1 04 00	LDR	#00
70A0 00 00 0C	JBR	#000C
70A0 00 00 10	JBR	#0010
70A0 04 0C 0C	LDA	>70FE, PC
70A0 01 00	CMPL	#00
70A0 10 04 7C 04	LDRD	>70A0
<i>Write file output of space chars - my address from H0H block</i>		
70A4 00 0C	BEQ	>70B9
70B4 14 70 05	LDRD	>70B4
<i>Subroutine, display 7 space chars - my address from H0H block</i>		
70B4 04 20	LDR	#20
70B9 00 00 0C	JBR	#000C
70B9 04 00 0C	JBR	#000C
70C3 00 01	BEQ	>70C4

70C3 04	RTB	
<i>Display my addressing in hex</i>		
70C4 20 00 31	LDRD	>70FA, PC
70C7 00 00	BEQ	>70CC
70C7 00 01	BEQ	>70CC
70C8 00	RTB	
<i>Display space char - 0 bytes (addressed by reg 0) in file</i>		
70CC 04 20	LDA	#20
70CC 00 00 00	JBR	#0000
70D4 04 00	LDA	#00
70D5 00 00	BEQ	>70D4
70D5 04 00	LDA	#00
70D7 00 04	BEQ	>70D8
70D7 04	RTB	
<i>Display char in reg 4 in hex</i>		
70D8 24 04	STWB	#
70E0 1F 0F	TRB	A, B
70E4 44	LDRD	
70E4 44	LDRD	
70E4 44	LDRD	
70E4 12	BEQ	
70E3 00 0F	BEQ	>70E0
70E5 3F 00	TRB	A, A
70E7 04 0F	ADDA	#00F
70E7 00 00	BEQ	>70E0
70E8 30 04	STWB	#
70E8 3F	RTB	
<i>Convert value in reg 4 (0-F) to ASCII char and display</i>		
70E8 00 30	ADDA	#30
70F0 00 34	CMPL	#34
70F2 05 0C	BEQ	>70F4
<i>Alpha 4 - F</i>		
70F4 00 0F	ADDA	#00F
70F4 00 00 0C	JBR	#000C
70F6 3F	RTB	
<i>Variable data area</i>		

4 writing hex strings, the "hex write prompt" will correspond exactly with the line of coding to be entered.

Once saved (start address 32000, length 410, entry point 0) — and the save verified with the program itself — the program may be loaded at any time with CLOADM, ensuring first that from at least 32000 memory is reserved for machine code (CLEAR 200,32000). (Should you get — shall we say — an interesting screen background to the title, you will probably find that you have failed to reserve the machine code area prior to loading!)

I save a copy of Tapescon at the

beginning of all my tapes for instant accessibility and load it into the Dragon every time I switch on — it saves an awful lot of hassle.

Only 410 bytes need to be saved as the remainder of the 875 bytes is the variable data area.

70FA	RMB 3	DFMLDAD
70FC	RMB 2	DFMENVRY
70FE	RMB 1	DFMLCNT
70FF	RMB 1	DFMAP
7F00	RMB 1	DFTYPE
7F01	RMB 255	DSBUFF

Even as I am writing this, my mind is working on further developments of Tapescon... How about ensuring that the

processor is currently working at the slower speed before accessing the tape for the first time (STORE any register to hex FF0000... is clearing the display to a primer (should you be so lucky), just a matter of altering the "JBR 0000" instructions to "JBR 000F"...)

Should you have found it too daunting a prospect to enter the Tooty code from the published listing, I am prepared to send readers a copy on cassette by return post on receipt of £3.50; for another £1, I will include Tapescon on the cassette, too. Address: Pam D'Acy, 21 Wycombe Lane, Woodsum, Green, High Wycombe, Bucks HP10 2HD. ■

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# The easy way to interfacing

Follow **A G Nanson's** instructions to build an analogue/digital interface – next month we'll show you how to use the interface to turn your Dragon into a simple storage oscilloscope.

TOP ROW		BOTTOM ROW	
Reading from Right to Left		Reading from Right to Left	
1	+ 11. 0000	2	+ 11. 0000
3	0000	4	0000
5	0000	6	0 00
7	0 00	8	0000
9	+ 2. 0000	10	00
11	00	12	00
13	00	14	00
15	00	16	00
17	00	18	0000
19	00	20	00
21	00	22	00
23	00	24	00
25	00	26	00
27	00	28	00
29	00	30	00
31	00	32	00
33	000000	34	000000
35	0000	36	00
37	00	38	00
39	00	40	0000 0000

Diagram 1: showed the jet out of the Dragon's cartridge chamber

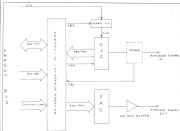


Figure 2. Anticoincidental interference shown as a block diagram.

**AWAY FROM THE** purely mechanical problem of getting at the cartridge connector (the address, data and control lines are accessed through this connector), interfacing the Dragon 32 is a relatively straightforward affair.

Perhaps it should be mentioned at this point that an indispensable aid to anyone wishing to interface a microcomputer is the circuit diagram. In the case of the Dragon II it should be possible to obtain a copy from Dragon Data itself. The TRS-80 Colour Computer Technical Reference Manual is also a veritable mine of information, much of which is applicable to the Dragon II. Another source of useful information are the data sheets for the various integrated circuits used in the construction of the computer, eg the MC88090 CPU, the MC68083/74LS1793 synchronous address multiplexer and the MC8047 Colour Video Processor Generator.

The pinout of the Dragon's cartridge connector is shown in Diagram 3.

The interface itself is shown as a block diagram in Figure 1 and in circuit form in Figure 2. The 25442R ASIC and the 25426R DAC are interfaced to the Dragon-32 via the signal of a 65522 VLSI (Versatile Interface Adapter). This device, as well as providing the 16-to-32 parallel data ports required by the converters, also provides the means to arbitrate the 25442R's synchronise the clock inputs and detect any triggering signal. Because of the comparative complexity of the 65522 VLSI, anyone not familiar with it is recommended to obtain the relevant data sheets.

## General procedure

The AGC connected to the B part of the 6822 VRA, the PERRA 274427, is an 8-bit successive approximation A-D converter. This is a good general purpose device, relatively cheap, easily obtained, and fairly fast. It has a 10 micro-second conversion time at a clock rate of 600 kHz. The clock signal for the 274427 is obtained from Pin 1 of the Oregon cartridge connector, the clock is gated to the 274427 via a 74121 2N1-state buffer, the purpose of which is to ensure that the incoming clock signal is synchronised to the start of conversion pulse which is obtained from the 6822 VRA's C43 control line.

The negative voltage for the ZN407 ADC (pin 14) may be obtained from a 7805 voltage converter IC as in the circuit illustrated; alternatively a dual voltage supply could be used. In any case it is suggested that a separate  $\pm 5$  Vdc (VCC) supply is used for the board rather than run the risk of malfunctioning the Designer's PDS.

The 6522 V/A is A port feeds the DAC, a Ferranti 23426 6-bit digital to analogue converter, the output of which is buffered by a LM358 op amp connected as a voltage follower.

For the home experimenter, it is largely a matter of taste and depth of pocket to the interface is constructed. For building experimental circuits I prefer to use breadboards or plug boards. Although the initial cost of these components is quite high, this is compensated for by the ease with which complex circuiting can be built.

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```

10 REM BEEP/BLANK (1) JET
20 CLS:PRINT@:STRING$(20,"*")
30 PRINT@50,"ADJUST BIPOLAR INPUT" (PRINT@70,STRING$(20,"*"))
40 PRINT@450,"PRESS BREAK TO ESCAPE"
50 POKE$HFF42.0:POKE$HFF43,$HFF
60 PRINT@99,"APPLY -4.96 VOLTS TO 'A' IN"
70 PRINT@163,"ADJUST OFFSET UNTIL READING"
80 PRINT@227,"JUST VARIES BETWEEN 0 AND 1"
90 POKE$HFF4C,$H8B:POKE$HFF41.0:POKE$HFF4C,$HCF:FOR J=0 TO 30:NEXT
100 PRINT@327,"READING=" ;PEEK($HFF40)
110 TIMER=0
120 IF TIMER<50 THEN 120
130 POKE$HFF4C,$HFF
140 PRINT@335," "
150 REM INKEY$ IF $H="" THEN 90 ELSE 170
160 REM ADJUST GAIN/BIAS
170 FOR Z=1120 TO 1375:POKEZ,$6:NEXT
180 PRINT@99,"APPLY +4.94 VOLTS TO 'A' IN"
190 PRINT@163,"ADJUST GAIN UNTIL READING"
200 PRINT@227,"JUST VARIES BETWEEN 254-255"
210 POKE$HFF4C,$H8B:POKE$HFF41.0:POKE$HFF4C,$HCF:FOR J=0 TO 10:NEXT
220 PRINT@327,"READING=" ;PEEK($HFF40)
230 TIMER=0
240 IF TIMER<50 THEN 240
250 POKE $HFF4C,$HFF
260 PRINT@335," "
270 REM INKEY$ IF $H="" THEN 210 ELSE 290
280 REM ADJUST OFFSET/BIAS
290 FOR Z=1120 TO 1375:POKEZ,$6:NEXT
300 GOTO 60

```

Program 1. In use in setting up bipolar operation of input circuit

POKE \$HFF4C, \$HCF (110-111))  
 Note that the BUSY output and the RD input lines of the ZH407 are tied together, so that the tri-state outputs of the ZH407 are automatically enabled when the data is valid. These two lines are also taken to the CA1 interrupt control line, which could be used, if desired, to generate a PRG via the IRQ output of the 6802, when conversion is complete. However, for the purposes of this article this is not required and the IRQ output is not connected to the computer, so CA1 is set to don't care.

Process data. After a short delay (approximately 10 micro-seconds) while conversion takes place, read the B port Input Register (IB) and process any data it may contain:

PEEK(\$HFF40)

The next thing to look at is setting up analogue input to the ZH407. For a detailed account of connecting various ranges of analogue inputs to the ZH407 the reader is referred to the relevant data sheets. The input circuit shown in Figure 2A is for  $\pm 5$  Volt full scale bi-polar operation. Before use this should be set up as follows:

- 1 Once the circuit has been thoroughly checked and all is OK, run Program 1.
- 2 Apply  $-4.96$  Volts to A in and adjust the offset pot until the LSD output just alternates between 0 and 1 with all other bits at 0.
- 3 Apply  $+4.94$  Volts to A in and adjust the gain pot until the LSD output just alternates

between 0 and 1 with all other bits at 1.

- 4 Repeat step 2.

Note that if the analogue signal is connected directly (via a 4 bit-to-one resistor) to pin 6 of the ZH407 then the analogue input range is between 0 volts and 2.55 volts.

Now on to digital to analogue conversion. Compared with the ZH407 ADC, interfacing the ZH406 DAC to the Dragon is quite straightforward. There are no clock signals, start conversion pulses or dual voltage supplies to worry about. The computer outputs data to the DAC through the A port of the 6822. The analogue output signal is taken from pin 4 of the ZH406 and is buffered by the LM358 voltage follower. (An alternative arrangement to the LM358 buffer is shown in the Ferranti data sheet on the ZH406 series.)

If the circuit is OK apply  $\pm 5$  volts to the converter and OP AMP. Although not shown in the circuit diagram (Figure 2), provision should be made to select all the DAC sections of the interface if it is not required. Set the gain control to maximum and with a Volt meter connected across the output run Program 2. Outputting zeros should result in a reading of about 0.00 Volts (This small offset voltage can be removed by using one of the circuits illustrated in the Ferranti data sheet). Outputting 255 should result in a reading of 2.55 Volts.

Next month I'll explain how this analogue/digital interface can be used to convert the Dragon into a simple storage oscilloscope. This is where the mysterious "Trigger" in Figure 2 comes in handy — as will be revealed. ■

```

10 REM BEEP/BLANK (1) JET
20 CLS:PRINT@:STRING$(20,"*")
30 PRINT@35,"CHECK OUTPUT OF ZH406 (4K)"
40 PRINT@67,STRING$(20,"*")
50 POKE$HFF43,$HFF
60 POKE$HFF41.0
70 PRINT@256,"MINIMUM VALUE APPROX 0.00 VOLTS"
80 PRINT@450,"PRESS BREAK TO ESCAPE"
90 TIMER=0
100 IF TIMER<300 THEN 100
110 FOR Z=1280 TO 1311:POKEZ,$6:NEXT
120 POKE$HFF41,$HFF
130 PRINT@256,"MAXIMUM VALUE APPROX 2.55 VOLTS"
140 TIMER=0
150 IF TIMER<300 THEN 150
160 FOR Z=1280 TO 1311:POKEZ,$6:NEXT
170 GOTO 60

```

Program 2. In use with a Voltmeter connected across the output

50 *Journal of Interpersonal Violence* 19(1)





```

510 DRAW=DR154,174"+R0R
520 DRAW=DR12,174"+R0R
530 COLOR=0
540 DRAW=DR40,174"+R0R:PAINT (0,164),1,1
550 DRAW=DR134,174"+R0R
560 PAINT (144,164),1,1
570 PSET (140,160,0)
580 COL=0,1:DRAW=DR124,174"+R0R
590 DRAW=DR70,174"+R0R
600 COL=1,0:DRAW=DR76,175"+R0R:PAINT (100,160),1,1:DRAW=DR76,150,164,162+R2-
610 FOR J=1 TO 15:STEP 2
620 GET (1,133)-(1+20,153):PC,0
630 PUT (1,231)-(1+20,433):PC,PRESSET
640 GET (1,155)-(1+20,175):PC,0
650 PUT (1,1)-(1+20,311):PC,PRESSET
660 NEXT J
670 FOR I=1 TO 0
680 READ P=C(1,1):P=C(1,2):I=1
690 FOR J=3 TO 6: C(1,3)=0:NEXT J
700 READ P=C(1,7):I=7: C(1,8)=P
710 NEXT I
720 X=0:Y=0
730 GET (1,45)-(1,65):CR,0
740 SCREEN=0
750 I=1:HEEY=0:IF I=0 THEN N=0
760 IF CR=CHEE(74) THEN Y=Y+22:IF Y=0 THEN N=0
770 IF I=CHEE(10) THEN Y=Y+22:IF Y=154 THEN N=154
780 IF I=CHEE(18) THEN N=0+22:IF N=0 THEN X=0
790 IF I=CHEE(9) THEN N=X+22:IF N=154 THEN X=154
800 GET (X+1,Y+1)-(X+21,Y+21):PC,0
810 PUT (X+1,Y+1)-(X+21,Y+21):PC,PRESSET:PUT (X+1,Y+1)-(X+21,Y+23):PC,PSET
820 IF P=0:340=22 THEN GOTO 830
830 IF C(P,PY)=1 AND P=0 THEN GOTO 810
840 IF C(P,PY)=7 AND P=1 THEN GOTO 810
850 GOTO 840
860 IF I=1 THEN N=0:GOTO 740
870 IF X=0 THEN X=0+22+16:SECY=1
880 IF Y=0 THEN Y=Y+22+16:SECY=1
890 FOR N=200,1
900 GET (X+1,Y+1)-(X+21,Y+21):PC,0
910 IF PPOINT (X+1,Y+1)=1 THEN PUT (X+1,Y+1)-(X+21,Y+21):CR,PSET:ELSE PUT (X+1,Y+1)-(X
+21,Y+21):CR,PRESSET
920 PUT (200,0)-(220,20):PC,PSET
930 RT=1
940 RETURN
950 COLOR=1:DRAW=DR"+STR$(1+20)+"",STR$(Y+20)
960 IF C(X,Y)=0 THEN GOTO 970,1:IF PPOINT (X+1,Y+1)=1 THEN PUT (X+1,Y+1)-(X+21,Y+23):
CR,PSET:GOTO 970:ELSE PUT (X+1,Y+1)-(X+21,Y+23):CR,PRESSET:GOTO 970
970 IF PPOINT (X+1,Y+1)=0 THEN N=0
980 PUT (X+1,Y+1)-(X+21,Y+21):CR,PSET
990 C(X,Y)=GOTO 740,800,810,820,830,840,850,860,870,880,890,900
990 DRAW=PAINT (X+0,Y+0),0,0:GOTO 970
990 DRAW=PAINT (X+0,Y+0),0,0:GOTO 970
990 DRAW=PAINT (X+0,Y+0),0,0:PSET (X+0,Y+0,1):GOTO 970
990 DRAW=PAINT (X+0,Y+0),0,0:GOTO 970
990 DRAW=DR2"+C4:PAINT (X+0,Y+0),0,0:PAINT (X+0,Y+0),0,0:GOTO 970
990 DRAW=DR601"+R0R:PAINT (X+0,Y+0),0,0:DRAW=DR76,150,164,162+R2-:GOTO 970
990 DRAW=PAINT (X+0,Y+0),0,0:GOTO 970
990 DRAW=PAINT (X+0,Y+0),0,0:GOTO 970
990 DRAW=DR2"+CR:GOTO 970
990 DRAW=DR601"+R0R
990 IF X=0 THEN X=0+22+16:SECY=1
990 IF Y=0 THEN Y=Y+22+16:SECY=1
990 IF C(P,PY)=1 AND C(P,PY)=7 THEN N=0
990 C(P,PY)=C(X,CY):C(X,CY)=0
990 PUT (200,0)-(220,20):CR,PSET
990 IF C(P,PY)=1 AND PY=0 THEN GOTO 140
990 IF C(P,PY)=7 AND PY=1 THEN GOTO 120

```

```

980 RETURN
990 COLOR=0
1000 PUT (X+1,Y+1)-(X+21,Y+21),OR,PRESET
1010 GNC(CX,CY) GOTO(20,30,60,100,140,180,220,260,300,340,380,420,460,500,540,580,620,660,700,740,780,820,860,900,940,980)
1020 DRAWPR:GOTO910
1030 DRAWPR:GOTO910
1040 DRAWPR:GOTO910
1050 DRAWPR:GOTO910
1060 DRAW"BC2"+OR;GOTO910
1070 DRAW"BC4D1"+OR;GOTO910
1080 DRAWPR:PAINT(X+10,Y+10),1,1;GOTO910
1090 DRAWPR:PAINT(X+10,Y+10),1,1;GOTO910
1100 DRAWPR:PAINT(X+10,Y+10),1,1;PRES1(X+8,Y+8,0);GOTO910
1110 DRAWPR:PAINT(X+10,Y+10),1,1;GOTO910
1120 DRAW"BC2"+OR;PAINT(X+10,Y+10),1,1;PRES1(X+10,Y+10),1,1;GOTO910
1130 DRAW"BC4D1"+OR;PAINT(X+10,Y+8),1,1;DRAW"BC7B5D6C8D9C8E2"+GOTO910
1140 PRES=PREY
1150 IFPR=" " THEN1140
1160 CX=FX;CY=FY
1170 IFPR="D" THENG(CX,CY)=5;GOTO740
1180 IFPR="B" THENG(CX,CY)=4;GOTO740
1190 IFPR="C" THENG(CX,CY)=3;GOTO740
1200 IFPR="B" THENG(CX,CY)=2;GOTO740
1210 GOTO1140
1220 PRES=PREY
1230 IFPR=" " THEN1220
1240 CX=FX;CY=FY
1250 IFPR="D" THENG(CX,CY)=1;GOTO740
1260 IFPR="B" THENG(CX,CY)=10;GOTO740
1270 IFPR="C" THENG(CX,CY)=9;GOTO740
1280 IFPR="D" THENG(CX,CY)=8;GOTO740
1290 GOTO1220
1300 DATA4,0,3,9,2,8,5,11,6,12,2,8,3,9,4,10

```

## Circles

From *Eden And in Newcastle-upon-Tyne*  
THIS COLOURFUL AND short program  
generates random circles of all colours  
available in high-res.

```

10 PMODE 3,1:SCREEN 1,1: 30 FOR B=1 TO 5:CIRCLE
PCLS (X,Y),B,RND(8):
20 X=RND(250):Y=RND SOUND,1:NEXT
(190):B=RND(150) 40 GOTO 20

```

## Drag

From *Simon Munell in Poole, Dorset*  
(DRA) is a simulation of dragster racing in  
PMODE 3. Use of the joystick is not  
needed (I only put them in to give you a  
feel of actually racing if you feel that this is  
not necessary simply delete lines 55 to  
63).

The race is calculated on the speeds  
reached after every 50th of a mile. This is  
displayed in text and then you are returned

to hi-res. There is the added danger of  
blowing a tyre. This tells you but you are  
still free to compete in the next race.

### Program notes

- 1-8 Tiddly bits
- 9-15 Instructions (if required)
- 20-25 Sets all variables required and  
a few more besides
- 30-38 Crosses the cars — GETs them  
into an array and draws the  
title (with animation too)
- 37-45 Crosses the arena and all parts  
that do not need to be redrawn  
every time

48-57

58-108

109-114

The program, once set, will run and run  
and run, all time immemorial.

```

1 REM*****
2 REM      B R A G
3 REM*****
4 REM BY SIMON MUNELL
5 REM*****
6 REM (C) MUNELL/DEPT 1983
7 REM      4TH DEPT 1983...
8 REM*****
9 CLS:PRINT120," WOULD YOU LIKE TO KNOW ABOUT
10 INPUT:IF AAA="Y" THEN 12
11 IF AAA="N" THEN 21
12 CLS:PRINT0,"Drag A GAME FOR THE DRAGON 32

```

THE GAME (Y/N) "

BY SIMON MUNELL.

Continued on  
page 58

## OPERATION GREMLIN . . .

A very different game that combines the intrigue of adventure with the real time, machine code speed of arcade action. The player must control not one, but **EIGHT** different troopers, each with their own character status, in the search for the weapons that will destroy THE GREMLIN.

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Feature the recently launched Dragon 32. The program described here is an extensively revised version of the one which was actually used in the exhibition.

assigning a value to a binary number of length 2M, so that N of the bits are equal to one, and N are equal to zero. Write this number down (2M times), to form a  $(2M) \times (2M)$  square, and then complement all the bits in the Mth row whenever the Mth bit of the original number was a zero. Outside this basic square, repeat the pattern in both directions by reflection.





```

110 INPUT "SCREEN=01, PRINTER=02":C
120 IF C=0 AND C=2 THEN 300
130 FOR I=0 TO 9 STEP 0.1
140 PRINT I-C, "END=01": " "
150 FOR I=0 TO 7
160 IF MOD(I+1)10 THEN PRINT I-C, "0":
170 PRINT I-C, "END=01": " "
180 IF C=2 THEN PRINT I-C, " "
190 NEXT I

```

```

200 PRINT I-C, " "
210 IF C=2 THEN PRINT I-C, " "
220 FOR I=0 TO 7
230 IF MOD(I+1)10 OR MOD(I+1)10 THEN PRINT I-C, " ":
    ELSE PRINT I-C, "END=01": " "
240 NEXT I
250 PRINT I-C
260 NEXT I
270 END

```

## Drawing

From Kevin Murray in Edinburgh

THIS program is designed to let the user get to grips with the Dragon 32's DRAW command and to help him design and construct larger and more complex instruction combinations.

The program stores the instructions in an array so that they can be easily

manipulated. If you run out of space for your instructions simply change the DIM statement in line 40 and extend the loops, etc where appropriate. The program has elementary error checking for typing mistakes but this will not deal with syntax-type errors (eg 40 instead of 04).

```

10 REM DRAW COMMAND
20 TITLE=DRAW COMMAND
30 DIM DRAW(100000)
40 DIM DRAW(100000)
50 DIM DRAW(100000)
60 DIM DRAW(100000)
70 DIM DRAW(100000)
80 DIM DRAW(100000)
90 DIM DRAW(100000)
100 DIM DRAW(100000)
110 DIM DRAW(100000)
120 DIM DRAW(100000)
130 DIM DRAW(100000)
140 DIM DRAW(100000)
150 DIM DRAW(100000)
160 DIM DRAW(100000)
170 DIM DRAW(100000)
180 DIM DRAW(100000)
190 DIM DRAW(100000)
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990 DIM DRAW(100000)
1000 DIM DRAW(100000)

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## Interfacing recorders

I AM having difficulty in deciding what the pins are for the tape socket. I tried to wire up a 5-pin DIN plug to two 1/8" diameter Jack plugs (ear and mike) with no success. Can you help?

M Clements,  
Lickfield,  
East Sussex

YET ANOTHER letter about the cassette interface! There have been many people asking for or details of the cassette socket for recording special records — even real to real recorders in one case!

The connection is via a standard 5-pin DIN plug which is easily obtainable. The pin connections are as follows:

- Pin 1 — Remote control (for motor on/off).
- Pin 2 — Ground (used as one connection for both Ear and Mike).
- Pin 3 — Remote control.
- Pin 4 — Cassette input.
- Pin 5 — Cassette output.

As both input and output use the same common ground connection, some recorders will cause feedback if both Ear and Mike leads are plugged in together. To avoid this, have only one of these plugged in at any one time.

## Printing cheaply

I WOULD like to add a printer to my set-up, but I cannot afford (or justify) something like the Epson. The obvious choice would be an Apple II at £250 plus I will feel this price rather high.

I was wondering, is it possible to tie into a Sinclair printer on my Dragon? I know the plugs won't fit the socket on my computer, but could you tell me, if it is possible, what adaptors or leads I will need, where can I get them and how much should I expect to pay for them?

A Nicholas,  
Worcester

A LOT of readers seem to want to use a Sinclair printer from their Dragons, the great advantage of this little printer being, of course, its cost. The disadvantage, however, is that it will not connect directly with any



machine other than Sinclair.

What is needed is a special interface which will convert the ASCII codes from the Dragon's printer output to the dot arrangements for the ZX printer. At last, a company is producing just such an interface — Printeface 2 is available for £26.95 from Microscopic Computer Systems Ltd, 16 Siphon Road, London SE27 (phone 01-893 1137). This will give you a 45-character line output, as well as the usual 8-line graphics that the printer offers.

## Proper timing

SHIFT IS the proper way of using the Dragon's timer for achieving a delay? I have tried the following which seems to work, but is there a better way?

```
10 TIMER = 0
20 T = TIMER
30 IF T = X THEN FUNCTION
40 GOTO 20
```

This produces a delay of 10 to 11 seconds if X = 500.

Is there an accurate figure as to how many times the timer "pulses" per second?

B Robinson,  
Reigate,  
Herts.

THE BEST devices use for the timer function is for timing, rather than for creating delays. The timer value is updated by the interrupt routine, which occurs exactly 58 times a second. Therefore, to get the time in seconds use TIMER/58. As the maximum value of Timer is 65535, this gives accurate values for up to 21 minutes before looping around to zero again, but you won't want 21-minute delay loops anyway!

A line such as that below is a

good way of using the timer for a delay (5 is the number of seconds which the program pauses for).

```
10 TIMER = 0
20 IF TIMER < 5 : GOTO 30
30 'rest of program
```

## Lower case

I AM writing a certain application program in which it would be desirable to take lower case character input. I wondered if there was some way in which SHIFT could be achieved from within a program without manual operation? At present I use PRINT\$ and translate to lower case.

A Brown,  
Rochester,  
Hants.

AS SHIFT 0 is supposed to generate the ASCII code 10, the obvious answer would be to use TORIG(10) to toggle between upper and lower case. Unfortunately, this doesn't work, of course. There is a simple POKE which can be used to control alpha lock — location 329. Use the following in your program: POKE 329, 255 for upper case POKE 329, 0 for lower case

If you poke any other number (1-254) in this address, you effectively disable lower case entry.

## Scrolling sideways

I WOULD like to know if it is possible to make everything on the high resolution screen scroll sideways, and if so, how?

I have used start machine code subroutines to do this with the first screen, and to scroll the home screen up and down, but

never from side to side. This would help me greatly in the programming of my Dragon.

F Murray,  
Birmingham

IF YOU want to stick to Basic, the only way to scroll the hi-res screen sideways is to get the whole screen in an array and use GET and PUT to move it around, for example:

```
10 PMODE 4,1:COLOR
20 LINE0,0-(255,191):PUT,0
30 DIM A(255:GET(0,0)-(
  254,191):A,G
40 PUT(1,0)-(255,191):A,PUT
50 GOTO 30
```

If you try this you will see that it does work, but is rather slow. You could speed it up by not scrolling the whole screen, or scrolling more than one pixel at a time. For most purposes this should be good enough, if, however, it is still not fast enough then you will have to dabdle in machine code.

## No Joy on games

I HAVE a Dragon 32 and I am trying to write my own games, but I can't do so with joystick. I know the bit about A-JOYSTK (0) or (1) or (2) or (3), but I can't figure out how to use it.

Could you please tell me how it's done?

John Corvo,  
London W7

AS THE Dragon Basic manual made such a mess of trying to explain the use of the JOYSTK command, it's not surprising that you are confused.

The command A-JOYSTK(n) will give A a value of between 0 and 63, A-0 for the left-right of the RIGHT joystick and A-1 for the up-down of the RIGHT joystick, similarly A-2 and A-3 for the LEFT joystick. A value of 0 indicates far left or all the way up, and a value of 63 indicates far right or all the way down.

A further complication is that the values of the joystick readings are only updated when 'n' is a zero, therefore sometimes you will need to put the value of JOYSTK(n) into a dummy variable just to get the correct reading for the other values.

There is no command for reading the fire button. This is done with PCIN(PCIN) and is quite simple.

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1. *Journal of the American Medical Association*, 1997; 277: 1039-1043.

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## ADVERT INDEX

A		I		R	
Abacus Software	48	Interlog	44	Rainbow	38
Adyn Software	47			Real Ram Data	50
AmigaSoft	15				
B		J		S	
B & H Software	38	J.C.B. Micro-Systems	48	S.P. Electronics	67
Beyond Software	28	Jay-Dan	62	Salemstar	60
Burton Software	40			Shards Software	12
C		L		Richard Shepherd	55 & 63
Compuser	34 & 35	M.C. Lathorian	47	Station	50
Computative	59			Stackade	60
D		M		System-Soft	60
D.A.C.C.	60	M & J Software	60		
Datsun	9	M.S.F. Consultants	9		
DeftSoft	47	Merun Microsystems	32	Tiger Software	47
E		Microdeal	2 & 68	Trojan Products	52
Eurosoft	44	Micro De-Bug	50 & 60	Tudor Williams	50
G		Monster	60		
Games & Computers	4	J. Morrison	39		
Grovesend	44				
H		O		T	
Hot Co-Co	30	Oasis Software	6, 5, 7		
		Onsoft	60		
		P		U	
		P.S.L. Marketing	42	Ultimate Software	60
		Peaksoft	24		
		Phaser	14		
		Program Factory	40		
				V	
				Vigen	27
				Virtuade	32
				W	
				West Devon Electronics	48
				Windrush Microsystems	10
				Wintersoft	54
				Wizzard Software	44

## Adding sound and speech

*A double chance to win a double prize from JCB Microsystems - if you can solve Gordon Lee's puzzle*

A NUMBER OF readers wrote in having had difficulty with the puzzle in the September edition of Dragon User. You may recall that the question involved two mathematicians, Sam and Paul, who had been given respectively, the sum and the product obtained from a throw of three dice.

After some time Paul, who had been given the product, stated that at best he could only narrow it down to one of two possibilities. Whereupon Sam, who had the sum, declared that he had narrowed it to three possibilities, but how he knew the values of the dice thrown.

Many readers tried to solve the puzzle by working out which dice throws could result in a sum obtainable in only three ways, and then tried to find the correct throw by relating these possibilities with the information given about the products. This failed to provide a unique answer. (For prices like these do you think it's going to be that easy!)

### Products . . .

Here is how it's done. With three dice there are three possible sums ranging from three (triple one) to 18 (triple six), and products from one (triple one) to 216 (triple six). In the case of the sums it can be readily seen that, with the exception of the very lowest and highest scores, there are many different possibilities. From this it would seem that Sam, who was given the sum, was at a disadvantage. This was not so — as we shall see.

Consider first the case of the products. First, run through all possible throws of three dice, counting the number of times that each different product is arrived at. This can be done with a simple program using the array (DIM P(216)). If the throws are generated in three FOR/NEXT loops A, B, and C, then  $G = A*B*C$ ;  $P(G) = P(G) + 1$  will do this. When generating the throws, if A is always taken as the largest value shown on the dice, and C the smallest, it will eliminate problems caused by duplication of throws. For instance, the throw of two, four and six in any order is only counted the once.

Now, as Paul is unable to provide an answer there must be more than one set of dice throws that can form that product. Ask the computer to print out these values: FOR N = 1 TO 216: IF P(N) > 1 THEN

### Prizes

THIS MONTH there are two sets of prizes to be won — so we're looking for two winners. Each will receive a package of software from JCB Microsystems of Bournemouth consisting of its Sound Extension Module, Speech Synthesizer Module, the arcade game Basic Goes Bouncing and Basic Enhancer, a utilities program which speeds up Basic by stripping out REM statements, etc.

### Rules

TO WIN the package of software you have to send in the most elegant solution to the puzzle. You must show both the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. As a talisman, complete the following sentence in 15 words or less: "I want to add speech and sound to my Dragon because . . ."

Your entry must arrive at Dragon User by the last working day in February 1984. The names of the winners, and the solution to the puzzle, will be published in our May issue. You may only enter the competition once. Entries will not be acknowledged and we cannot enter into correspondence on the final result.

### PRINTER: NEXT N

From this we can see that Paul must have been given either 4, 6, 8, 12, 16, 18, 24, 36, 36, 48, 60, or 72 as the product.

The next step is to modify the program to print out the dice values for these products. The results should be listed in table form.

Product	Values of the dice (sums in brackets)		
4	2,2,1 (5)	4,1,1 (6)	
6	3,2,1 (6)	4,1,1 (6)	
8	2,2,2 (6)	4,2,1 (7)	
12	3,3,1 (7)	4,3,1 (8)	6,2,1 (9)
16	4,2,1 (8)	4,4,1 (9)	
18	3,3,2 (8)	6,3,1 (10)	
24	3,3,3 (9)	4,5,1 (10)	
24	4,3,2 (9)	6,2,2 (10)	6,4,1 (11)
30	5,3,2 (10)	6,5,1 (12)	
36	4,3,3 (10)	6,5,2 (11)	6,6,1 (13)
48	4,4,3 (11)	6,4,3 (13)	
60	5,4,3 (12)	6,5,3 (13)	
72	6,4,3 (13)	6,6,2 (14)	

While all this has been happening, we assume that Sam, realising that the sum that he has been given is not much use on its own, would be preparing such a table, since he might reasonably suppose that as Paul did not immediately come up with an answer, there must be more than one possibility open to someone who only knew the product.

Sam would then compare his sum with the values on the table. Therefore, once Paul announced that he has narrowed it down to two possibilities, only if Sam's sum was 17 would he be able to make the statement: "I had reduced it to three possibilities, but now I can eliminate all but the correct one." The important clue that many readers missed was that Sam's statement was not made until after Paul had made his, and it was made on the strength of Sam having prepared the table of values and not solely on the sum that he had been given. Therefore the three dice thrown were: 4,4, and 3.

I hope that all puzzled readers' minds at rest. And in case any readers are also wondering why no winner is announced this month, the answer is that is simpler. Because at Christmas this issue of the magazine had to be put together earlier than usual, before all the competition entries had come in. So you'll have to wait for the next issue to find out who's won the Dragon 64 — and how. In the meantime here's the latest competition, which makes the most of a traditional February event.

### . . . and pennies

There was an unusual game at the Youth Club Valentine's Day Dance. The prizes were "poetry" chess, and the object was to win as many as possible. First of all some slips of paper were numbered consecutively from 1 to 200 and each player was invited to choose one of these slips. The players had then to line up in front of a table on which were the box of chess and a card with these instructions:

on it:

TAKE A PENNY CHEW.

IF THE NUMBER ON YOUR SLIP OF PAPER CONTAINS AT LEAST ONE SEVEN, THEN ADD 7, OTHERWISE SUBTRACT 15.

IF YOUR NUMBER FALLS TO LESS THAN 1 YOU MUST RETIRE FROM THE GAME.

GO TO THE BACK OF THE QUEUE AND WAIT FOR YOUR NEXT TURN.

The game continued until all the players had been eliminated. The following statements were overheard: Annabel: "I had the maximum possible number of sweets" — Bryan: "Both Jane and I had 30 sweets each" — Christine: "I had eight sweets less than Annabel" — Daniel: "The number of sweets I received was the same as the number on my paper at the start of the game, but with the figures reversed". However, one of the statements was incorrect. Who made it, and what numbers did the others start the game with?



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All three programs cost £9.95 each and are available for the DRAGON 32, BBC MODEL B and 48k ORIC-1 microcomputers. (note: Fishy Business for the BBC and ORIC will be available February 1984).

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